DOCUMENT RESUME

ED 173 086

SE 027 871

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TITLE	An Energy Curriculum for the Elementary Grades. Unit I - Energy and You, Unit II - Energy and Your Community, Unit III - Energy in Action.
INSTITUTION	Indiana State Dept. of Commerce, Indianapolis. Energy Group.; Indiana State Dept. of Public Instruction, Indianapolis. Div. of Curriculum.
SPONS AGENCY	Department of Energy, Washington, D.C.
PUB DATE	May 79
GRANT	DOE-EW-78-G-45-0042
NOTE	519p.; For related document, see ED 167 355; Contains occasional light and broken type
EDRS PRICE	MF02/PC21 Plus Postage.
DESCRIPTORS	Community Problems; *Elementary Education; *Energy; *Energy Conservation; *Environmental Education; *Life Style; Problem Solving
IDENTIFIERS	*Energy Education

ABSTRACT

The collection of materials is intended to provide for the needs of elementary school teachers who have needs for resources for energy education. The document is divided into three sections. The first section discusses human energy, energy use in home and school, and the relationship of the individual to the energy problem. A second section discusses the role of energy in the community, the consumer's role in energy production, and the existence of energy use patterns. The third section covers the production of energy, some approaches to solving energy problems, and the impact of energy decisions on the social and physical environment of the future. Each lesson includes suggested adaptations for grade level, language arts instruction, and mathematics instruction. (RE)

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An Energy Curriculum for the Elementary Grades

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AN ENERGY CURRICULUM FOR THE ELEMENTARY GRADES

Indiana Energy Group
Indiana Department of Commerce
Lt. Governor Robert D. Orr, Director

Division of Curriculum
Indiana Department of Public Instruction
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ACKNOWLEDGEMENTS

The Energy Education Curriculum Project was coordinated by the Indiana Department of Public Instruction, Division of Curriculum with the support and assistance of the Indiana Department of Commerce Energy Group, Clarence Broadus, Director

These materials were authored by Judith A. Gillespie of the Energy Education Curriculum Project and were developed at the Social Studies Development Center at Indiana University, Bloomington. Joel Pett has served as artist for the project and developed all of the illustrations. Mary Soley aided in the development of these materials.

Kathleen Lane and Margaret Van Gundy, Energy Education Consultants, have coordinated the dissemination and evaluation efforts. They have written the glossary, surveys and bibliographic materials that accompany these lessons.

John A. Harrold, Director of the Division of Curriculum and consultants from the Division have worked closely with the developers of the materials. Jerry Colglazier, Senior Consultant; Catherine Haynes, Early Childhood Consultant; Martha Mitchell, Elementary Education Coordinator; Victor Smith, Research and Evaluation Consultant; and Joe Wright, Environmental Education Consultant have offered many suggestions which serve to improve these lessons.

Linda Shapiro, Energy Education and Residential Coordinator, Indiana Energy Group, has assisted the project by giving valuable help and suggestions.

These materials have been substantially revised based on comments of teachers throughout the state who piloted the test materials. These teachers and their students have made valued contributions during the summer months, and their help has been appreciated.

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This publication was prepared with the support of DOE funding through Grant #EW-78-G-45-0042.

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INTRODUCTION

Energy is an important problem. Its significance increases daily. Over the last decade schools have taken an increasing responsibility for teaching about energy problems and conservation activities. These materials have been designed for use in elementary schools in the K-6 grades. Hopefully they will meet the needs that teachers have for both systematic and creative materials for energy education.

This introduction is designed to help teachers make the best possible use of these materials. It is divided into three parts. The first part is a rationale which gives the background ideas and motivation for the materials. Here we stress the ideas that we are trying to develop effective energy actors and how elementary students can be trained in awareness, knowledge, skills and participation habits necessary to promote their effective action in energy areas which are important to them. The second section focuses on lessons. It indicates the methodology of the program, how to use the lessons, and possible lesson sequences. The final section focuses on assessment. It demonstrates how to evaluate students' use of the materials in order to determine whether or not the class is meeting the objectives of the program.

RATIONALE

Most of us can point to some part of our lives that involves avoidance behavior. We postpone a medical checkup. We "forget" to vote in local elections. We tune out fairly explicit messages from our family that a vacation is long overdue. Until we arrive at the hospital emergency room, are scandalized by political corruption, or are threatened by family exile, we do not normally act. We all do it. Avoidance is a common pattern in our lives. We must set priorities, for there is only so much attention we can give to a wide range of problems.

The energy problem is basically one of avoidance for most of the American public. Most people would probably not think about the problem at all. As a recent Gallup survey demonstrates, 42 percent of the American people think the energy situation is "only fairly serious." Fourteen percent say it is "not at all serious." Specifically, 31 percent feel that reducing the amount of driving is "not at all important."[1] Others point out the problems in significantly cutting their driving mileage. Essentially, they have other priorities.

Because of this avoidance, solutions to the energy problem must focus on changing patterns of people's everyday lives, and priorities for energy conservation and the use of alternative technologies must be raised. The President cannot change these patterns and priorities, at least not alone. The people must. And they must start now.

Because the problem is essentially one of changing priorities and life style patterns, then energy education rests at the core of the problem-solving process. Policy pronouncements help, but the 55 mile per hour speed limit continues to be flagrantly violated. Economic incentives help, but heating bills in most homes continue to rise, and are generally paid. Coal strikes raise the visability of the problem, at least for those who are less creative than some third-grade students in an Indiana school who put ice cold cloths on their thermostat in order to raise their classroom temperature.

Education is important because establishing and changing behavior patterns are the essence of its definition. The current Commissioner of Education, Ernest L. Boyer, puts it this way:

> "The energy crisis we now face will require not only new technology, but new values and new attitudes as well. We must change our habits of consumption. We must approach self-indulgence with a new perspective--an understanding that we are members of a human community, with a common plight and a common fate. And all of this is closely tied to our nation's schools and colleges."[2]

Indeed, the need is one of human survival, and the schools have a major role to play.

These materials deal with one small but significant part of the need for energy education. The EECP aims to design, develop, evaluate, and disseminate curriculum materials on energy education for use in the K-6 elementary grades. An elaborate foundation document for the project can be found in "A Plan for an Energy Curriculum for the Elementary Grades" which is available from the Indiana Department of Public Instruction. Here the major ideas, objectives and methods of the program will be summarized. Hopefully, the rationale will give you reasons for what is being done in these materials and help you work more effectively with the major ideas of the project in the classroom.

Curriculum Goals and Objectives

There are a wide range of goals and objectives which could be developed for any energy education effort. What is disconcerting about most guidelines that are set out by states, private organizations, or the schools themselves, is that they lack an integrated conceptualization of what they are about. There is no image of the personal or societal outcomes which should result from the materials.[3] There is a set of informational and skill guidelines for which relatively isolated and independent activities are developed. The attempt here will be to develop a systematic conceptualization of an effective energy actor as the outcome of instruction and to delineate principal competencies such an actor must attain.

The conceptualization begins with an image of a person. This person can be called an "effective energy actor." In this case, the word "effective" means that a person has the awareness, knowledge, skills and habits necessary both to conserve energy in his or her everyday life, and to understand and utilize new technologies and new energy sources. "Effective" means both thinking about energy problems and acting in relation to them. Without thinking and doing, a person cannot be effective in relation to the energy problem.

An "actor" who is effective is a conserver and a utilizer of new technologies. The word "actor" is important here. An individual is an actor as an individual. In this sense, an energy actor is a consumer of energy resources. People act individually every day to consume energy. An effective energy actor will, as an individual, be a conscientious consumer of energy resources.

Yet an effective energy actor is also a member of one or more groups. The group can be a school, family, community, work, and/or service group. In these settings, an effective energy actor acts as a citizen, or as a member of a group who needs to coordinate his or her actions with other group members. As a group, participants in school settings make conscious or unconscious decisions to use energy. As a group, families take actions which make an impact on the energy problem. An effective energy actor will work in a variety of these common groups to make decisions and take actions which help to solve energy problems. Therefore, an effective energy actor is not only an effective individual consumer, but an effective citizen or member of a group. Both of these dimensions of energy activity are important to an energy actor's role.

A more concrete image of an effective energy actor can be drawn by considering the case of a typical consumer, who for our purposes can be named Carla. Carla Consumer is an accountant for a large corporation in her hometown of Midville, Kansas. She is proud of her two elementary school children. She is also a not-so-bad actress in her local theater group, and a member of a citizen planning committee.

Carla is used to taking roles. In her office, she knows that efficiency and accuracy count, and she has saved the corporation thousands of dollars through the cost-saver plans she has initiated. She considers this to be an important part of account management. She also currently has a lead role in "Pygmalion," and after work she memorizes lines and rehearses her role as Eliza. She is finally reaching the point where she can easily and naturally assume Eliza's expressions, mannerisms and actions on stage.

Yet Carla assumes another role, one about which she once thought a lot, but which has now become so natural she does not need to consciously make plans or memorize lines. When she rises in the morning, she turns on one light in her hall, and turns it off when she enters her kitchen. She uses one burner to cook her family's breakfast. She turns off the heat when she leaves the house. She participates in a car pool with three friends who must drive to work. As she reads a magazine during the drive, she learns more about the costs of installing solar heating, something she believes will be possible in her home.

Carla does not consciously think about her consumer role, because it has become a part of a pattern in her life. She does, however, consider energy use an important concept for her two children to learn. She teaches, or preaches (according to her children), an energy ethic which she hopes will become as natural for them as it is for her. She is now teaching them the lines in a play which she considers to be as difficult as, and even more important than, her role in "Pygmalion." She recognizes the similarities in the process of learning a role, and the high stakes involved. The whole family is participating in their "energy play."

Tonight Carla is also participating in a meeting of the Midville Energy Committee. They are drawing up a plan for energy use for the city. They are asking hard questions about possible new alternative energy sources for homes and businesses. The city council will vote on their plan next week. Some community leaders are opposed to the plan, and the Committee is busy gathering information to support their ideas. Next Thursday evening will be a big night for Carla and the Committee. If they can get the plan approved and make it work, they will have a model for other Kansas communities.

Carla is an effective energy actor, regardless of the city council vote. In her everyday life, she exhibits at least four competencies which are important to her success. First she is *aware* of the energy problem. She shows interest by her own individual actions and those activities she jointly undertakes with her fellow workers, her family and her community. She recognizes the need for conservation and careful consideration of alternative energy resources. She also cares. Concern is a very important component of the awareness competency.

A second characteristic of an effective energy actor involves *information*. An individual must be informed about energy resources, policy choices, and alternative actions that can be taken now and in the future. Such information is vital to competent thinking and action for an effective energy actor. Carla gains information through the media in the magazine she is reading, but also does more formal, systematic work to support the plan her energy committee is formulating.

Carla also shows important *inquiry skill* competencies. She knows how to ask good questions and collect evidence in order to think in well-grounded and systematic ways about a problem. She is doing this in her home and in her energy group. An individual also must recognize his or her own values and be able to apply these values to everyday energy situations. Carla recognizes her own conservation values as she tries to clearly articulate them to her two children. She also recognizes the value of others as she tries to prepare for opposition in the city council meeting. These skills of analysis and valuing are key competencies for any effective action on the energy problem.

Finally, an effective energy actor such as Carla must have important *habits of participation*, both in everyday living and in group activity, which promote the conservation of energy and the use of new technologies. These participation habits involve her individual role as a consumer in a variety of conservation strategies. They also involve her group activity which promotes knowledge, awareness, and action in her community, and potentially in other communities, states, the nation and global organizations.

When these four general competencies -- awareness, information, inquiry skills, participation habits -- are integrated together they constitute the essential characteristics of an effective energy actor. Each competency is itself important. When they are combined, a powerful multiplier is put into place which maximizes the potential contribution an individual can make to as universal and significant a problem as the energy problem.

Carla Consumer is a model of an adult energy actor. As such, she represents a long term goal for an elementary school curriculum. Elementary students are not raising children, working as accountants or participating as members of the Midville Energy Committee. Preconditions must be considered which will stimulate long-run outcomes.

What, then, are reasonable preconditions for the development of effective energy actors? Piaget and other researchers have demonstrated important developmental opportunities and barriers in the elementary years.[4] Students can develop energy awareness, as long as it is self- or peer-centered awareness. They can learn basic information if useful, concrete examples are provided from their everyday environment. They can begin to develop inquiry skills in terms of lower or middle level discrimination of ideas and objects. They can act in simple roles that are self-oriented (student as consumer) rather than group-oriented (Ralph Nader or President Carter). Real limits are placed on comprehension, analysis, abstraction and role-taking. Yet the opportunities are also great.

The central thesis here will be that, given these real limits, students can be effective energy actors in their own everyday environment. They must not wait to become adults. In fact, the world will not wait for them. In theory, they need not wait; rather they can develop basic, very basic, attitudes and behaviors which will grow in dimensionality over time.

Consequently, the model of an effective energy actor must be scaled to the size of elementary school students. It need not be discarded or demonstrably changed. Roger, a third grader, serves as an example. Roger is a young effective energy actor. He is aware of his own energy resources (physical, mental, emotional, etc.) and those around him. He cares about turning out lights at home and school. He raises questions about energy use in his community environment. He even participated in designing a conservation plan for his school.

Roger continuously practices what he believes. He walks to school and friends' houses. He tries to get others to do so. He participates in family decisions about energy use. He works with classmates to conserve energy at school. He talks with young (and older) friends about new ways to confront concrete energy problems in his own everyday environment. He sets a model, and acts to improve energy situations wherever he sees them.

In these ways, Roger may have as much impact in his everyday world as Carla has in hers. Their approaches and methods, context and specific outcomes may well be different. Yet each is important now, as well as in the future.

Therefore, the main curriculum goal will be to provide instruction which will promote effective energy actors of which Carla (or Carl) Consumer is a future model and Roger is a current model for elementary students. Four sub-goals involve the development of competencies in awareness, information, inquiry skills, and participation habits. Each of these four sub-goals serves as a general domain for the development of specific instructional objectives. These objectives are highlighted in the list on the following page.

CONTENT OUTLINE

I. Energy and You (K-1)

   A. Human Energy. Basic awareness activities. Identification of human energy which is part of students' everyday lives. Personal energy inventory.

   B. Energy in Your Home and School. Basic awareness, information, and inquiry skill activities (question-asking). Identification of non-human and human energy and energy products in local environment. Energy survey.

   C. The Energy Problem and You. Basic awareness, information, and participation activities. Key dilemmas introduced by short case studies. Students see how concerned actors make a difference.

II. Energy and Your Community (2-3)

   A. Energy in Your Community. Information about human and non-human energy and energy products in the community. Introduce evidence-gathering skill. Resources of different types of energy actors.

   B. Using Energy. Awareness. Information about how energy is used. Apply evidence-gathering skills. Consumer role in relation to use.

   C. Energy Habits. Develop information and concern over patterns of energy use. Apply evidence-gathering skills. Decision-making skills in relation to distributing resources.

III. Energy in Action (4-6)

   A. Energy Coming and Going. Focus on energy transformations -- sources to products. Develop interest. Develop citizen role.

   B. Solving Energy Problems. Recognition of and concern over important problems. Apply action processes to community, etc. Develop valuing skills. Group decision-making skill as part of citizen role and problem-solving. Major individual/group/class project to apply information, inquiry skills, participation.

   C. Energy Outcomes and the Future. Awareness of positive and negative effects of use for physical and human environment. Recognition of positive and negative effects of use for person/economic-social-political environment. Focus concern on short and long run futures. Stress personal and group role and decision-making adaptations. Personal energy conservation plan.

OBJECTIVES

AWARENESS

1. Students will demonstrate interest in the ideas of energy conservation and alternative uses of energy, as well as their roles as energy consumers and citizen (group) problem-solvers.
2. Students will recognize fundamental energy resources, their use and distribution as well as the basic characteristics of their consumer and citizen roles.
3. Students will demonstrate concern by rating energy and their roles in the energy situation as high priority problems.

INFORMATION

1. Students will know and use the concept of resources (human and physical) in identifying energy problems in their own everyday environment.
2. Students will know and use the concept of outcomes (physical and human) in assessing solutions to energy problems in their own everyday environment.

INQUIRY SKILLS

1. Students will ask clear and significant questions about energy and their roles in the energy problem.
2. Students will gather evidence related to energy questions.
3. Students will articulate their values and apply them to energy situations.
4. Students will speculate about alternative futures in energy use and problem-solving.

PARTICIPATION HABITS

1. Students will practice consumer roles in energy situations in their everyday lives.
2. Students will practice individual and group decision-making roles in groups which are important to them in their homes, school and community.

USING THE LESSONS

The general energy curriculum is outlined in the following page. Within each unit, awareness, information, inquiry skills and participation habits are developed. Specific units are developed for each segment of the curriculum. They are core social studies/science units. Each unit has three chapters and each chapter has six lessons. The lessons within the chapters are differentiated by grade or ability level. The main lessons in the first unit focus on K-1 grade levels; the second unit is targeted at 2-3; the third at 4-6. With each core lesson, a set of adaptation lessons are keyed to other grade levels, and for language arts and math applications. Therefore, teachers will use a core lesson with one or more adaptations depending on their interests, needs, and particular class characteristics. This format will promote both structure and flexibility for the use of the materials in elementary classrooms. The individual lessons are all structured similarly. The structure and principles behind that structure will be explained in this section.

Within the units the chapters are structured similarly. There are three chapters in each unit. The chapters are separated by a rationale and a set of objectives that give unity to their use. Chapters need not be used in sequence within units. However, they are designed with a certain sequence in mind. Teachers who use chapters out of sequence should check to make sure the basic ideas and methods from previous chapters are covered.

Within each chapter of the materials there are six lessons. The lessons are designed to meet the objectives that are specified at the beginning of the chapter. Each lesson is similarly sequenced with a rationale, objectives, main activities, adaptations, and student materials that are necessary in order to conduct the lesson. Also, a selected, annotated bibliography of additional instructional materials can be found at the end of each unit. These have been chosen because they complement the main ideas presented in each unit.

All of the units, chapters, and lessons in the course are based on certain instructional principles. First of all, each lesson represents a variety of activities for students. Teachers may want to use [illegible] of the activities or only some of them. In each case, five or six different activities are designed to stress similar concepts and skills that are taught in the materials. Students should have ample opportunity to achieve the objectives of the course through the use of a variety of activities. All of the material that is necessary to conduct the activities for students is contained in each lesson.

The first principle, then, is a variety of activities. The second involves the use of the school, home, and community environment. This is important. Effective energy actors cannot act alone; they must act with community members in order to mutually solve energy problems. This strategy will not only reinforce student learning but will maximize the impact of the materials when they are used.

Finally, each objective stated in the lessons is assessed through assessment activities at the end of the chapter. We believe that all objectives should be able to be evaluated by teachers. Students should have the opportunity to do activities which evaluate whether or not they are gaining important ideas and skills from the lessons.

These ideas constitute the structure and principles involved in using the curriculum materials. Below we will sketch an outline of a typical lesson and how it can be effectively used by teachers who want to maximize their utilization of the materials in this package.

Lessons

The basic format for the lessons is illustrated below. As you can see from the illustration, each lesson contains a rationale, objectives, teacher's instructions, core lesson material, adaptations and material that is necessary to use in working with students, either as a class or individually.

Rationale
Objectives
↓
Teacher's Instructions
↓
Core Lesson Implementation Guidelines
Grade/Ability Level, Language Arts
and Math Adaptations
↓
Core Student Lesson Materials

The above structure indicates how each lesson in the materials generally proceeds. As you read about the sections of a lesson, turn to a lesson to see exactly how the following description relates to it.

Rationale. For each lesson in the materials a rationale is included. The rationale indicates to the teacher what the purpose of the lesson is and gives a summary of what students will do in the lesson. By reading the rationale the teacher can fully comprehend why the lesson is included in the materials and what in general students will be doing in the lesson.

Objectives. Each lesson also contains one or more objectives. The objectives are stated so that teachers can see what students are expected to gain from the individual lesson. With each objective the assessment measure is also listed. In each case teachers can assess students' achievement of the objectives through particular activities which are contained within the lesson or through assessment activities at the end of the chapter. For introductory lessons and concluding lessons the evaluation is often provided totally within the lesson itself. For those lessons in the middle of the chapters which stress concepts and skills, evaluation is normally found both within the lesson and through the chapter assessment activities.

Main Activity. Each lesson contains a main activity. This is the core social studies/science activity for the lesson. It involves multiple parts. Instructions are given to the teacher about how to conduct each section of the lesson. Teachers may want to use all sections of the main activity or they may want to stress only certain sections and not others. Where materials are needed in order for students to do the lesson, these can be found at the end of the teacher's instructions. They are always referenced in the main activity according to how they need to be used.

The main activities have been designed to provide a diverse number of ways in which students can complete the objectives. For example, students may be asked to play a game, make an object, compile a list, or discuss what they did. The main activities provide a number of ideas for teaching the objective.

Grade Level Adaptations. Grade level adaptations are included for each lesson in the materials. In the case of a lesson from Unit I, grade level adaptations are included for grades 2-3 and 4-6. These adaptations are included because the main activity, as others in Unit I, is designed for K-1. A teacher who wanted to use this activity in grades 2-3 or 4-6 could get important ideas about its adaptation and use from this section of the lesson. In Units II and III, grade level adaptations are developed for K-1 usage. In this way, a K-1 teacher could use the entire sequence of units, adapting them to his or her grade level. On the other hand, a teacher beginning with students at the 4-6 level could find adaptations in earlier lessons.

Language Arts Adaptations. Language arts adaptations are included with each lesson of the materials. They cover the full K-6 sequence. The purpose of the language arts adaptations is to have students integrate their study of energy with core topics that they are covering in language arts. The language arts adaptations cover spelling, grammar, sentence construction, creative writing, oral presentations, and other language arts skills. They are designed to be used directly with the energy lessons. This way a teacher might choose a language arts adaptation and use it as an activity as part of the study of the energy materials. Through each of the lessons, students can do activities which relate to particular language arts skills the teachers are using in the classroom. These adaptations represent ideas. They are stimuli for ideas teachers might have on their own of how to integrate these two important areas, energy and language arts, together for effective instruction.

Math Adaptations. The math adaptations are also included with each lesson for each grade level. In this way teachers can integrate together basic math skills that they are teaching with the study of energy. Fundamental mathematical concepts can be easily integrated into the energy lessons. Again, the math adaptations represent ideas. Teachers may wish to use their own ideas and techniques in blending together the study of energy and the learning of basic math skills.

Student Materials. Following most sets of teacher instructions, student materials can be found which are useful in the lesson. These may be pictures, stories, or checklists. Teachers can duplicate these materials, put them on an overhead projector, or use them as they are found in the text. In this way, all the materials which are needed for the lesson are provided for teachers using the materials.

This summary provides a way to see the format for lessons and how they can be used. Of course, teachers can and should use their creativity in making their own adaptations to needs of their particular students and their own ideas.

Lesson Sequences

Perhaps the best way to think about the curriculum materials that are included in this package are as a resource library for teachers. The materials have been designed to create maximum flexibility while retaining sequential integrity. Literally, a bookshelf of lessons have been created so that teachers can pick and choose those that are most applicable to them. The materials can be used both in straight lesson sequences, through a chapter, a unit, or throughout the entire package or teachers can pick and choose. Hopefully teachers will find the lessons that they choose rewarding and perhaps even exciting.

Lessons can be sequenced in a straightforward way. Basically, the first lessons are designed to create awareness; those that follow, knowledge; then skills; and then participation habits. Each chapter in each unit is structured according to this sequence. This is based on the belief that students need to have awareness before knowledge will be meaningful, knowledge before skills will take on meaning, and all of these things before participation habits can truly be established. Each lesson, each chapter, and each unit build a base of awareness, information, skills and participation habits which help students to do other lessons and to be motivated to learn more about energy.

However, teachers can as easily use lessons from different chapters and combine them to make their own unit. A teacher might, for example, want to choose lessons from Units I, II, and III to create his or her own curriculum package. In this case, lessons from Chapter One of Unit I might be combined with those from Chapter One of Unit II which then might be combined with those from Chapter One of Unit III. This is a justifiable sequence and certainly would enhance student learning. Teachers will find throughout the chapters references to concepts and skills which are integrated into the text. All a teacher need do in the case that a concept or skill is needed is turn to the lesson in which it is introduced and work with students on a few of the activities in the lesson in order to gain basic knowledge or skills needed to do lessons which are found in later chapters or units. Therefore, the combination of sequences is infinite. Hopefully, teachers will use the table of contents for their own ideas and classroom needs and will provide an important sequence of lessons, either those provided here or those created by the teachers themselves.

This information on the use of lessons should help teachers to see the basic structure of the course, the principles that are involved, and the possible lesson sequences which can be created. The lessons are designed to stimulate teacher and student creativity; adaptations of all kinds are certainly welcomed and encouraged. If you are using these materials and you create a particularly useful lesson, staff at the Division of Curriculum are interested in hearing about your ideas. Write to Kathleen Lane or Margaret Van Gundy at the Division of Curriculum if you have important ideas which you think are useful in the classroom. These ideas will be communicated to other teachers.

ASSESSMENT

Assessment is a key feature of the curriculum materials. There are two kinds of assessments involved in these curriculum materials. The first kind is a set of activities which is attached to each chapter. Teachers will find that these activities can be used in conjunction with individual lessons or at the end of a chapter to provide a general assessment. The second is activities contained within the lesson. The kind of assessment is specified with each objective.

In each case, the assessment activities are just that--activities. They are things that students can do as a class activity or as a homework assignment. Keys are provided for all of the assessment activities in the general introduction at the beginning of the assessment section of each chapter. Teachers should find that most students can achieve the objectives of the chapter through the use of these assessment activities. If students have not achieved the objectives, then additional activities should be constructed in order to assure that students have learned important awareness, knowledge, inquiry, and participation skills that are pinpointed in the objectives.

A general pre-test and post-test are being developed and will be available through the Division of Curriculum of the Indiana Department of Public Instruction. This instrument can be used before the curriculum has begun and then after the curriculum materials are finished so teachers can assess the changes in scores of individual students or of the class as a whole. Hopefully this will enable teachers to communicate to principals or community members about the performance of students.

All in all, the assessment program is both general and specific for these curriculum materials. Teachers should be able to gain important knowledge for themselves and knowledge that they can communicate to administrators and community members who wish to determine the effectiveness of lessons included in this package.

CONCLUSION

Hopefully teachers and students will use these materials to become more effective energy actors. We also hope that schools will become more effective due to these activities and that people in homes and communities will become more energy conscious due to students' activities in various lessons and units contained in these materials. As you work through various lessons in these materials your feedback and advice is sought by the author and by the consultants at the Division of Curriculum. If you have ideas or comments or unique and creative lessons which you have developed please send them to the following address:

Kathleen Lane or Margaret VanGundy
Energy Education Consultants
Division of Curriculum
Department of Public Instruction
Room 229, State House
Indianapolis, Indiana 46204

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FOOTNOTES

1. "Public Remains Unconvinced of Energy Problem," Gallup Opinion Index, 149, December, 1977, p. 15.

2. Ernest L. Boyer, "The Energy Agenda of the U.S. Office of Education," in Council for Education Development and Research, Education Confronts the Energy Dilemma, Oak Ridge, Tennessee: Technical Information Office, U.S. Department of Energy, 1977.

3. Robert M. Jones and John E. Steinbrink, A Survey of Precollege Energy Education Curricula at the State Level, Houston: The Energy Institute, University of Houston, 1978, p. 8.

4. The early works of Piaget are especially important here, including The Language and Thought of the Child, New York: Harcourt Brace, 1926.

GLOSSARY OF TERMS

1. body power - the terminology used to define human energy
2. calorie - the amount of heat required to raise one kilogram of water 1° Celsius
3. coal - a solid fuel, mostly carbon, formed from the fossils of plants living hundreds of millions of years ago
4. community - a part of a city where people live and act together in doing things
5. conservation - taking care of things so that they will last longer
6. crude oil - liquid fuel formed from the fossils of animals and plants at the bottom of ancient seas
7. energy - the ability to heat, light, and move things
8. energy actor - a person taking action on an energy problem
9. energy alternatives - various substitutes for existing energy sources
10. energy consumer - someone who uses energy or energy products
11. energy disposer - a person who discards used energy or energy products
12. energy interdependence - people and groups around the world needing to exchange energy sources and products
13. energy product - anything that is made from and energy source and which requires energy for its production
14. energy shopper - a person who buys or sells energy or energy products
15. energy sources - the supplies from which we receive energy
16. energy transfer - a process in which one system supplies another system with energy
17. food - the raw materials used by plants and animals for nourishment
18. fossil fuels - fuels derived from the fossil remains of organic materials; includes oil, natural gas, and coal
19. heat - a form of energy in motion that flows from one body to another because of a temperature difference between them
20. human energy - the energy produced by a person's body
21. hydropower - energy in stored or moving water
22. kilowatt - a unit that measures the rate at which energy is produced o used equal to 1,000 watts

23. kilowatt hour - a unit of energy equivalent to that transferred in one hour by one kilowatt of power

24. miles per gallon - the number of miles that a car can drive on a gallon of gas

25. natural gas - gaseous fuel formed from the fossils of ancient plants and animals

26. neighborhood - a group of people who live near each other

27. non-human energy - all types of energy other than human energy (e.g. electricity, gasoline, etc.)

28. nuclear energy - energy contained within the nucleus of the atom which can be released by nuclear fission or nuclear fusion

29. recycling - to reuse a product through reprocessing

30. solar energy - energy derived directly from the sun

31. transformation - the change in form or appearance from a source to a product

Unit 1: Energy and You

An Energy Curriculum for the Elementary Grades

energy
education
curriculum
project

Lt. Gov. Robert D. Orr, Director
Indiana Department of Commerce

Harold H. Negley, Superintendent
Indiana Department of Public Instruction

UNIT I: ENERGY AND YOU

Rationale

This unit aims to develop awareness about energy problems. It's designed to be used with students in grades K-1. Its central concerns are about students' interest in energy, their recognition of the basic dimensions of the recognition, and concern are fundamental elements of awareness. It is these elements that this unit is designed to address.

The first chapter focuses on personal energy. It begins with the student and tries to help students see how they are an important energy source. It is very important that this first chapter be taught with awareness in mind. At this point in the course the kinds of knowledge and skills students have regarding the energy problem are not a main concern. Students' awareness that energy is an important part of their everyday lives and that there are things they can do about energy problems is a vital concern.

The second chapter focuses on energy in students' homes and school. Students study physical energy sources in their environment and apply what they learn to taking care of energy in their homes and in their classroom. They also make plans to do something about the energy problem that they see.

The third chapter focuses on the energy problem as a problem of people's habits. Students learn about basic consumer roles that they take on an everyday basis. They also learn about how to make decisions on energy questions.

Throughout the first three chapters, a basic theme that is involved is conservation, or taking care of energy. Students learn how to take care of their personal energy and energy in their environment. They will also stress conserving energy as a high priority in their everyday lives.

Objectives

Chapter 1

1. Students will gain awareness of themselves and how they use human energy (Lesson One).

2. Students will become aware of their body power (Lesson Two).

3. Students will become aware of how feelings are an important part of understanding human energy (Lesson Three).

4. Students will be aware that thoughts are an important part of understanding human energy (Lesson Four).

5. Students will become aware that everything needs to be taken care of, including human energy (Lesson Five).

6. Students will define conservation and discuss the idea that human energy needs to be taken care of, just like everything else (Lesson Five).

7. Students will become aware of ways that they take care of their human energy (Lesson Six).

Chapter 2

1. Students will be aware of energy products around them (Lesson One).

2. Students will be able to recognize energy products in their classroom (Lesson Two).

3. Students will be aware of the use of energy products in the school environment (Lesson Three).

4. Students will extend their awareness of energy products through a study of their homes (Lesson Four).

5. Students will develop skills in asking questions related to the energy problem (Lesson Four).

6. Students will be aware of the uses of energy products in their homes (Lesson Five).

7. Students will be aware of actions they can take regarding energy problems and will apply their awareness to actions in their homes and at school (Lesson Six).

Chapter 3

1. Students will be aware that they are energy consumers in their everyday lives (Lesson One).

2. Students will be aware of how they are energy shoppers on an everyday basis (Lesson Two).

3. Students will be aware of themselves as energy users (Lesson Three).

4. Students will be aware of their role as energy disposers (Lesson Four).

5. Students will recognize how individuals can help in the energy problem (Lesson Five).
6. Students will know basic decision-making skills (Lesson Five).
7. Students will rate their consumer role as a high priority in their everyday lives (Lesson Six).
8. Students will practice skills in taking their consumer role in decision-making (Lesson Six).

CHAPTER ONE: YOU HAVE ENERGY

Rationale

The purpose of this chapter is to develop students' awareness of how they are individual sources of energy. The intent is not to emphasize information but to help students realize what their own energy is, the forms it takes, and how they are users and sources of energy.

The frame of reference for these lessons is each student and his or her immediate surroundings. The chapter is also designed to introduce and create awareness of the conservation of energy. The purposes of the last set of activities are to help students to become aware that they have the ability to decide how they can take care of their own energy sources and choose alternative ways to use their human energy in their classroom, school, and homes.

Objectives

1. Students will gain awareness of themselves and how they use human energy (Lesson One).
2. Students will become aware of their body power (Lesson Two).
3. Students will become aware of how feelings are an important part of understanding of human energy (Lesson Three).
4. Students will be aware that thoughts are an important part of understanding human energy (Lesson Four).
5. Students will become aware that everything needs to be taken care of, including human energy (Lesson Five).
6. Students will define conservation and discuss the idea that human energy needs to be taken care of, just like everything else (Lesson Five).
7. Students will become aware of ways that they take care of their human energy (Lesson Six).

LESSON 1-1: WHAT IS HUMAN ENERGY?

Rationale

This lesson is the first of a series of activities which focus on human energy. Energy can be divided into human and environmental parts. Here we introduce one aspect of human energy -- physical or body energy. In later lessons, students will learn about intellectual, emotional and other aspects of human energy. (Even later, they will learn about non-human energy and energy products.)

"What is Human Energy?" is designed to promote awareness, not knowledge. Students will think about, act out, and become curious about themselves and how they use energy. Hopefully, they will have fun as a stimulus for later learning. This is the beginning, not the end, of a discovery of human energy.

Objectives

Students will gain awareness of themselves and how they use human energy. Teachers can assess the attainment of this objective by students' description of their daily energy use in Part G of the main activity.

Main Activity

A.
1. Select a heavy object in the room or school grounds. Ask the students to help you move the object.

   or

2. Ask students to move some desks or tables in the room.

   or

3. Play a game such as jumping rope or throwing a ball that involves the students using their physical energy.

B. Discuss with students what they did, asking how they were able to perform the task in A. Use responses such as "I am strong" to get them to talk about their own physical strength. You may want to use the following questions to guide the discussion:

   1. What did you just do? (i.e., moved a table)

   2. What helped you to do it? (i.e., my strength, my arms, my energy)

C. Now write the words "Human Energy" on the board, or on a big sheet of paper. Discuss with students how they used their energy in Activity A. Energy can help us to move things. We use energy to help us do things every day. Students should see how they have just used energy to move something or play a game. Have students draw an example of energy they use, or have them act out using energy in class or on the playground. Students might act out playing a game or riding their bikes, walking or running. Be sure that students understand that energy involves motion. It is not energy unless it is used to do something.

D. Use pictures 1-1 through 1-5 to show people using energy. Ask students to describe the actions that the boys and girls are doing in each picture. Ask them what energy the actions require.

Picture 1-1:	Girl brushing teeth. This takes arm energy.
Picture 1-2:	Girls and boys raising hands in class. This takes arm energy too.
Picture 1-3:	Girl riding tricycle. This takes leg and arm energy.
Picture 1-4:	Girls and boys jumping rope. It takes leg energy to jump, and arm energy to move the rope.
Picture 1-5:	Boy finishing race. This takes leg energy, but also breathing and heart energy.

E. You can have students color the pictures. As they are coloring, you may want to discuss their pictures with them individually and show how the boys or girls are like or unlike them in using energy.

F. Discuss the fact that people have energy, and we use our energy every day. Help students to see how energy is important to us every day by discussing the following questions and listing students' responses to Question 1 on the board or paper under the word "energy."

1. What did you do yesterday or today which used your energy? (i.e., ran, walked, played ball)
2. What things on the list would you not be able to do if you had no energy? (i.e., almost everything)
3. Why is energy important to you? (i.e., because everything we do requires it)

G. Suggest to the students that they can call their energy their "body power." Ask them to make a list (in their heads or on a piece of paper) of the human energy they use from the time school ends that day until they leave for school the next morning. Tell them members of their family can help them.

H. When students return to class, have them describe their uses of their body power. Write their items on a big sheet of paper that can be saved with the words "Body Power" at the top.

Grade Level Adaptation

2-3: You may want to substitute different pictures from those which students have drawn, or from magazines. You may also have the students keep a written list for more than one day.

4-6: You may want to substitute stories or newspaper articles which show how different people use their body power. Articles from the sports section of your local newspaper may be very effective. You may also want students to select a famous person or event you are teaching about and write an essay about the use of body power rather than keeping logs.

Language Arts Adaptation

K-1: Have students add words to their list of body power from other activities they do in class, and learn to read them to the class.

2-3: Have the students pick out acts of body power from a story they are reading.

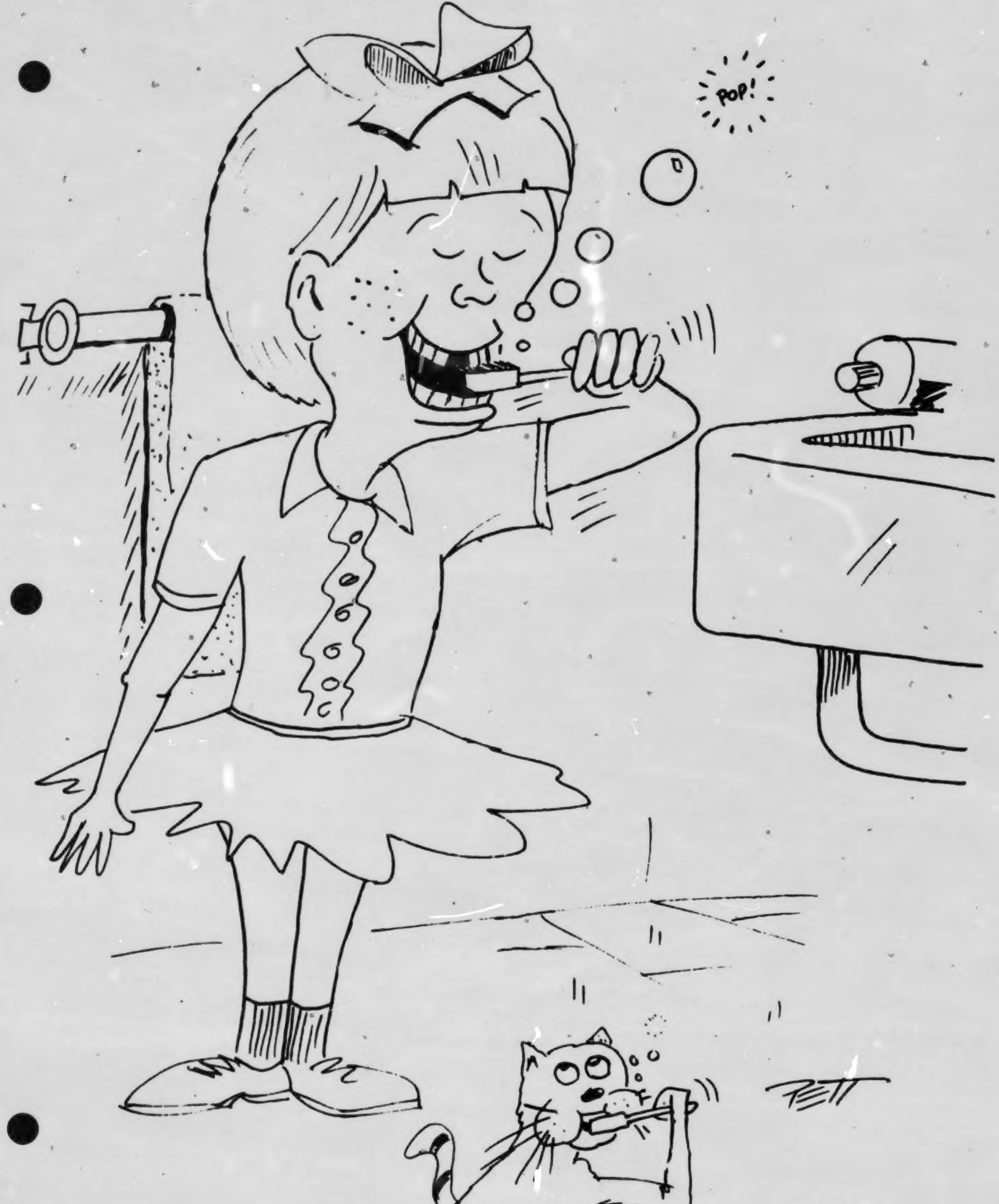
4-6: Have the students write a short story about how they best enjoy using their body power, or about when they did something that made them feel strong. Share some of these with the class and/or post them for everyone to read.

Math Adaptation

K-1: Use the pictures from Activity D to help students to learn the concepts of "more" or "less" body power. Does it take more body power to brush your teeth, or to ride your bike?

2-3: Have students count and compare the number of students needed to move different sized desks or tables in the classroom or cafeteria.

4-6: Have the students weigh various objects and compare the effort they must exert to lift them or a combination of them.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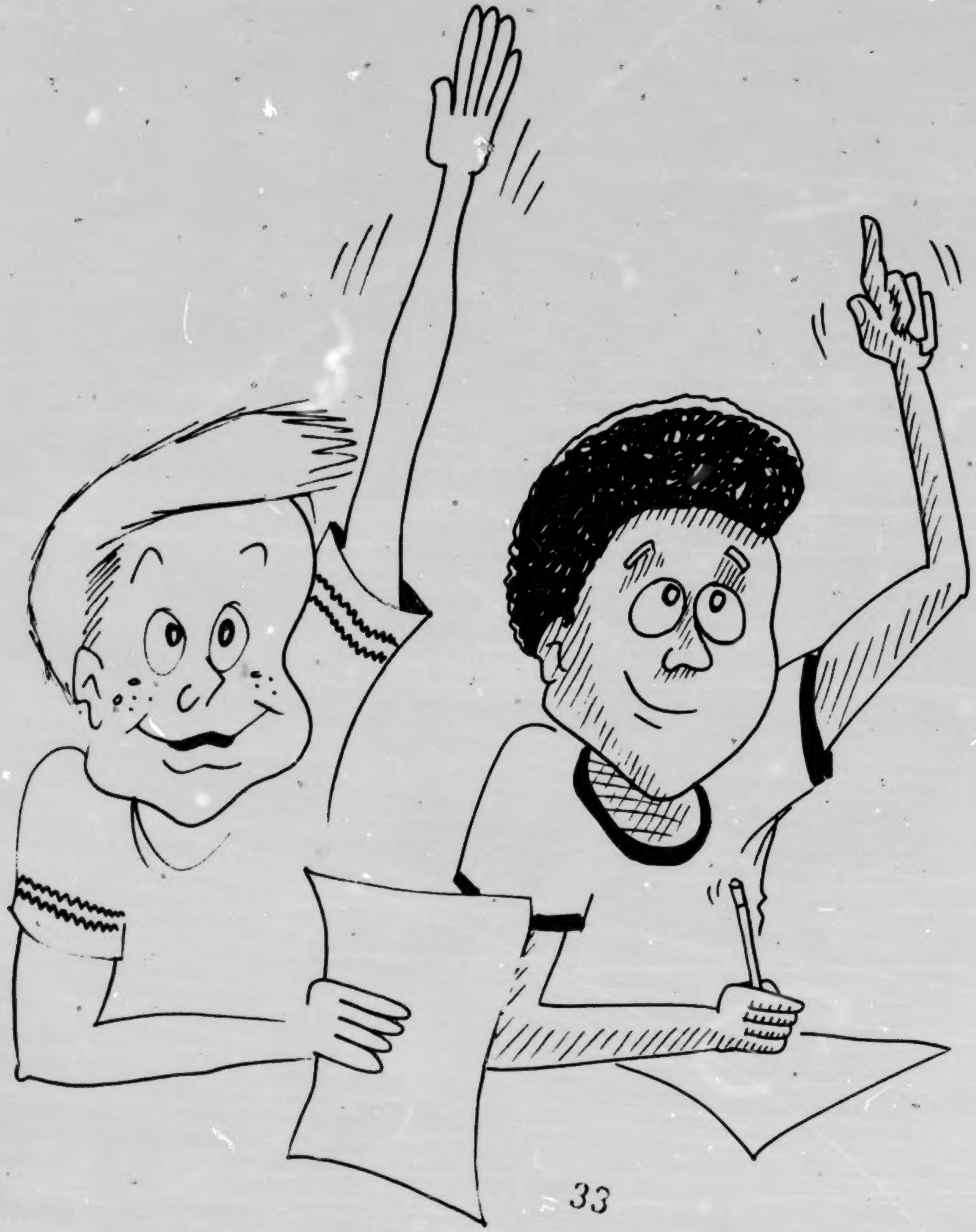

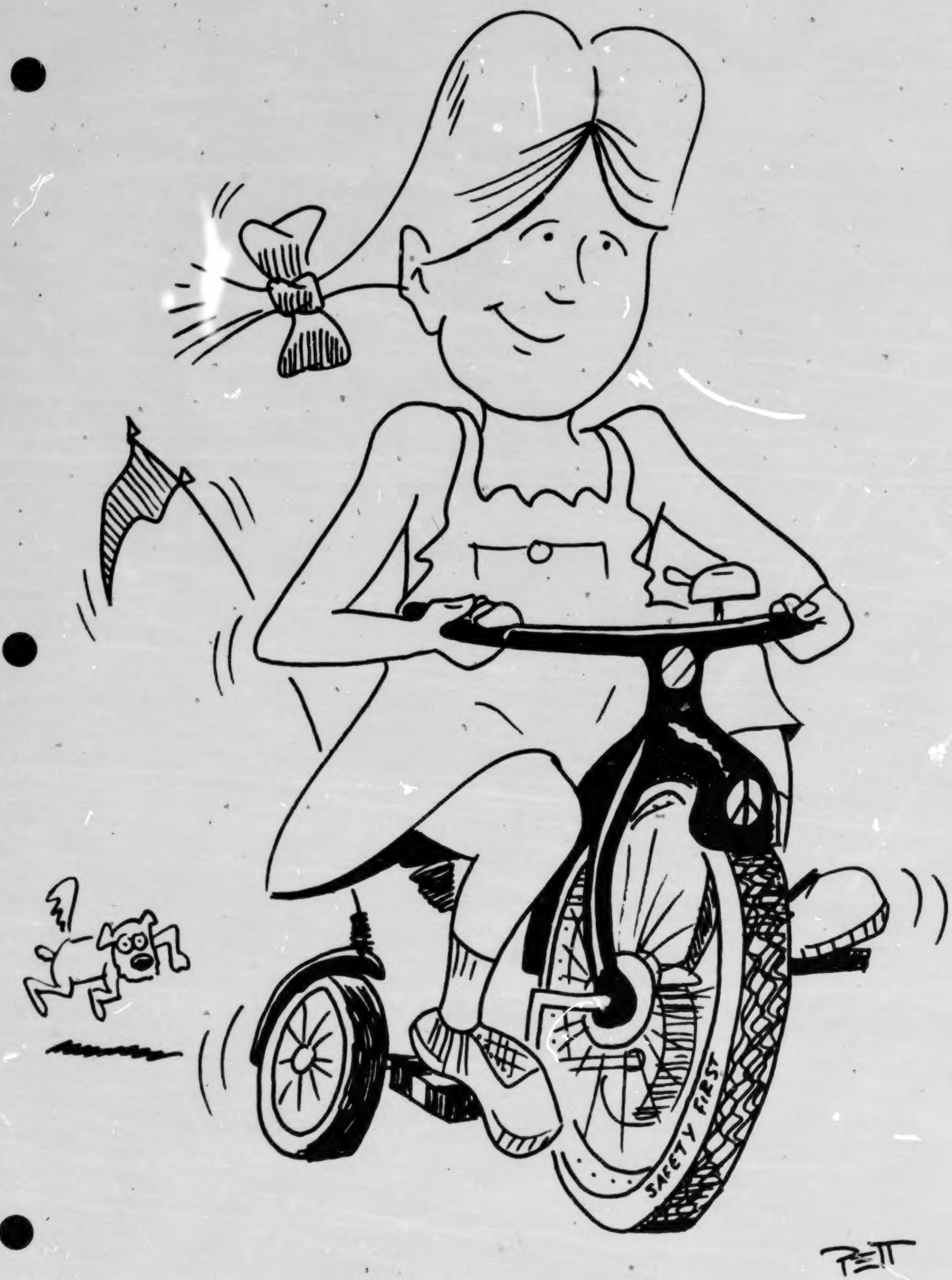
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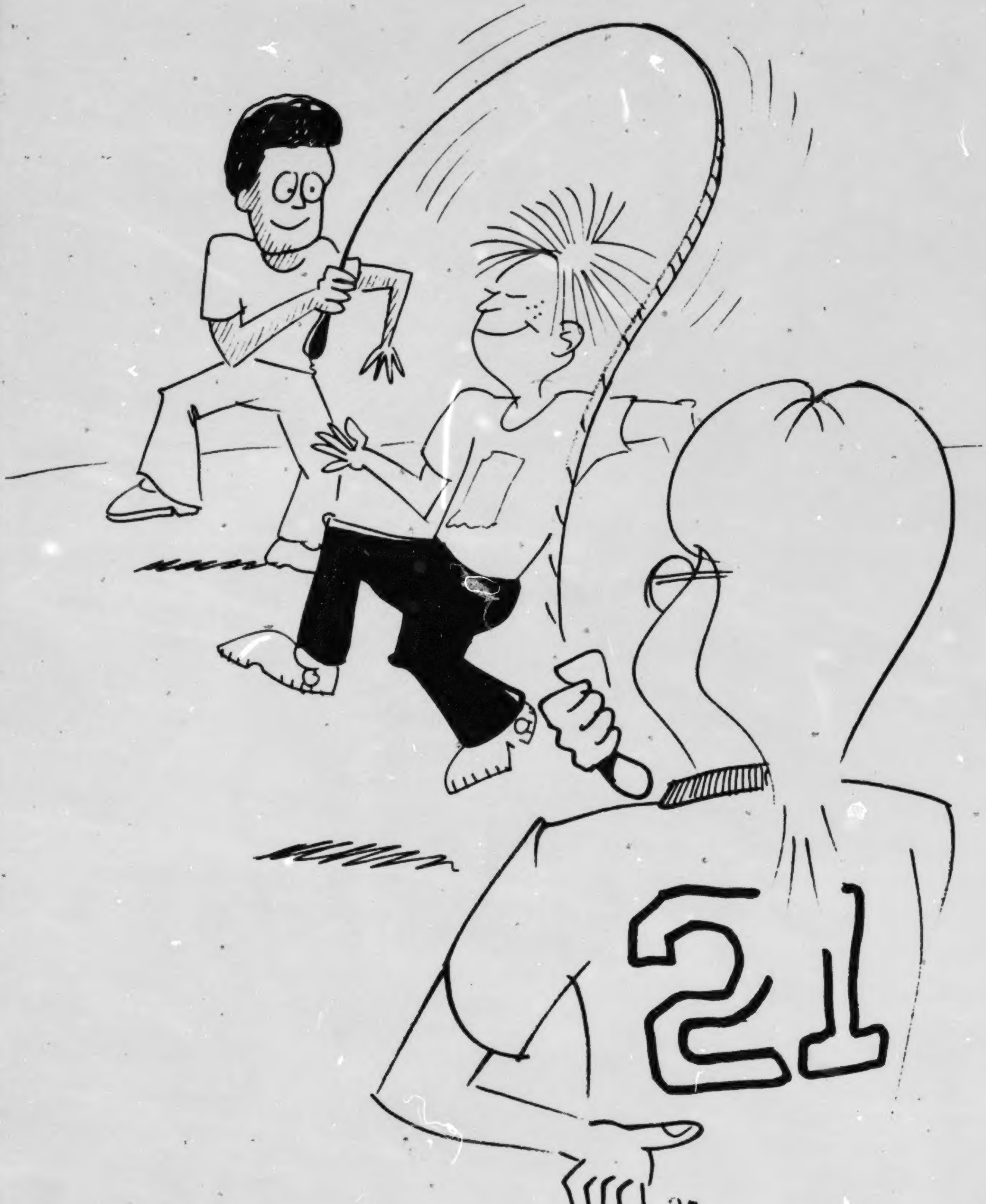

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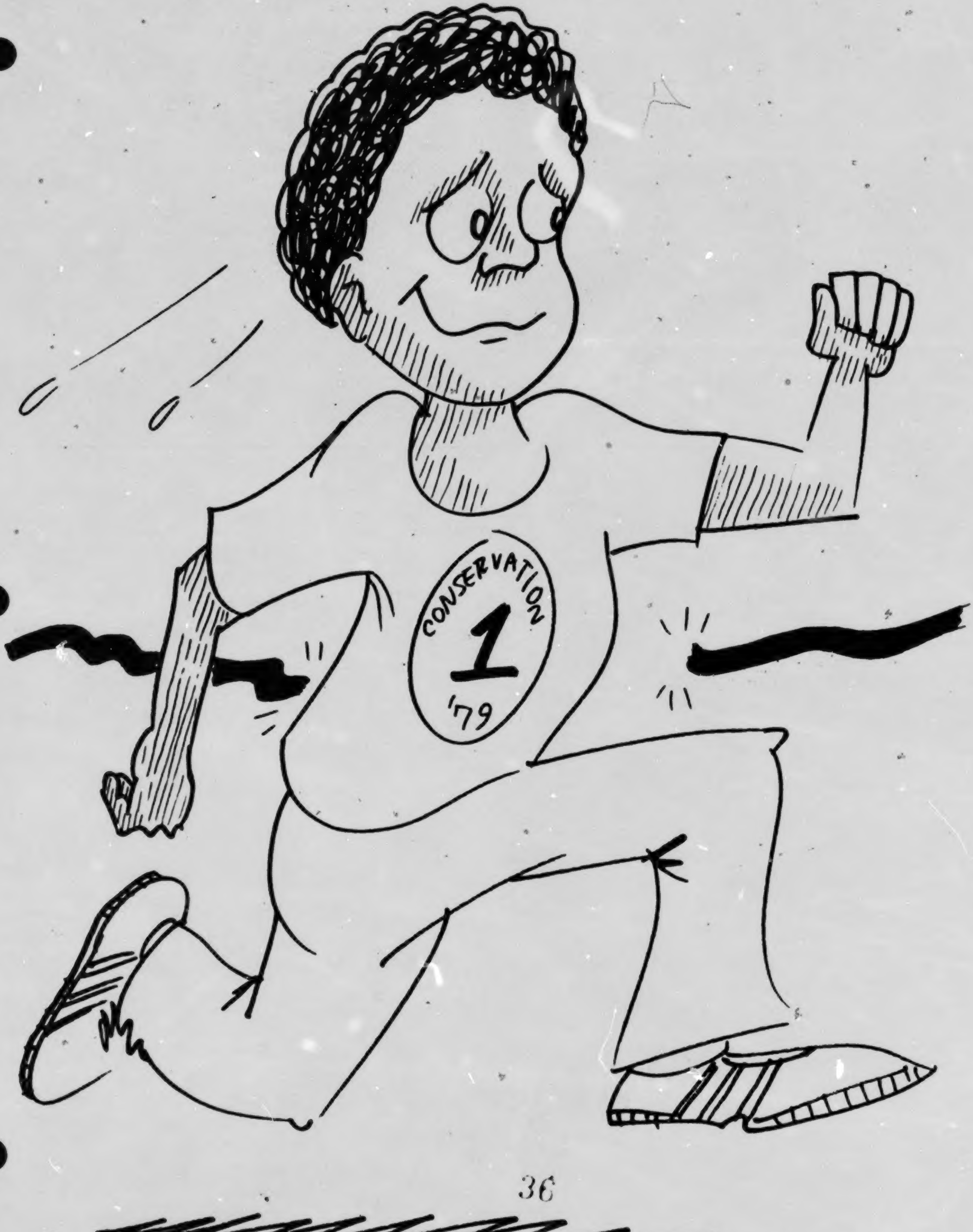
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LESSON 1-2: BODY POWER

Rationale

Students have learned about human energy. This lesson will build awareness of the power of students' bodies. They will develop both awareness and some knowledge of their own physical energy characteristics.

Learning about body power is important. Students use it every day. It is one concrete basis through which they can understand how they use energy every day, how it is important to them, and why it is important to them.

Objective

Students will become aware of their body power. This objective can be assessed by students' responses in Activity G or by using Assessment Activity 1 at the end of this chapter.

Main Activity

A. Take any story that you have told to students, or one that you want to tell in the future. Be sure that this story has a hero or a heroine, and that it illustrates some ways in which this person uses body power. Read the story to students, then discuss with them ways in which the hero or heroine of this story used his or her body power. Put the words "Body Power" on the board. Talk with students about different ways in which they use their body power and how important it is to them.

B. Use the pictures that are enclosed with this lesson to talk with students about different ways they use their body power. They should see that like the hero or heroine in the story, they also use their body power, and they use it every day. Discuss each of the following pictures in terms of what body power is being used and how important it is.

Picture 2-1: Walking. Students walk every day. They use their legs and arms to walk. They also use every part of their bodies. Walking is good exercise. It is important because it is one way to get from one place to another. It is a way that is used frequently by elementary students.

Picture 2-2: Playing. Playing uses energy. It uses arm and leg energy. In this case, energy is used to have fun. We can enjoy using energy and we do it every day.

Picture 2-3: Eating. We use energy when we eat. We use our arms and our teeth and other parts of our bodies to eat. Point out to students that eating is also a source of energy, or the way that we get the body power that we have. We both use energy and bring into our bodies by eating.

C. Have students color the pictures that they just discussed, or have them draw pictures of their own showing different ways that they use their body energy every day. Post their pictures around the room so that they can be reminded of the variety of ways in which they use their body power.

D. Talk with students about how they use energy to walk. Have them walk around the class or the playground of the school and ask them to think about what parts of their bodies they use to walk. Discuss with them how they use their legs, their arms and their feet in order to walk anywhere. Have students draw pictures of themselves walking someplace that they go every day, or have them talk about where they have walked this week. Be sure to illustrate that they use their body power in order to get from one place to another, whether it's another room or another part of the community.

E. Talk with students about how playing is a way of using energy. Ask them to think about how they play at recess, or play a game with them in class. Ask them which game they play that they think uses the most body power. Have them play that game and talk about it afterwards. Ask students questions about what parts of their bodies they use and how important body power is in playing the game.

F. Now talk with students about eating. They use energy when they eat. Have students either eat something in class or talk about what they ate for breakfast or for lunch. They certainly use their arms, teeth, and other parts of their bodies in eating.

Then explain to students that eating also involves something else. It involves getting energy as well as using energy. Their bodies get energy from the food that they eat. They should realize that the body will not supply them with energy unless they eat foods. They should also eat the proper foods. Talk with students for awhile about how the food they ate for breakfast or the food they are eating in class will help them to have more body power and to be able to use it when they need it every day.

G. Summarize body power for students by either bringing a picture or a model of a human body to class and having students talk about what parts of the body produce physical energy that they use every day. You might also want students to act out different things they do every day in front of the class and have other students say what they are doing and what physical energy they use. Then discuss either the picture, or model of the body, or students' actions using the following questions.

1. In what ways do we use energy? (i.e. We use our arms to draw pictures; we use our legs to walk.)

2. Why is body power important? (i.e. We need it to do almost everything that we do every day.)

3. What would we do without body power? (i.e. We could do practically nothing without body power. If people are weak they can do very few things, as when they are sick.)

Grade Level Adaptation

2-3: Use a model of a human body as a basis for this lesson. Have students show how different parts of a body are used for body power. Have students pick examples out of stories they are reading which illustrate how people in the stories use their body power. Have them talk about what it would be like if people could not use their body power.

4-6: Have students do a log of all the things that they do with their bodies during a day or a week. Have them pick out newspaper or magazine articles which demonstrate different aspects of the use of body power. Have them write an essay on their own use of body power in a given time period.

Language Arts Adaptation

K-1: Have students use puppets to act out different ways that they use body power.

2-3: Have students analyze a story that they are currently reading in terms of the body power that is used by people in the story.

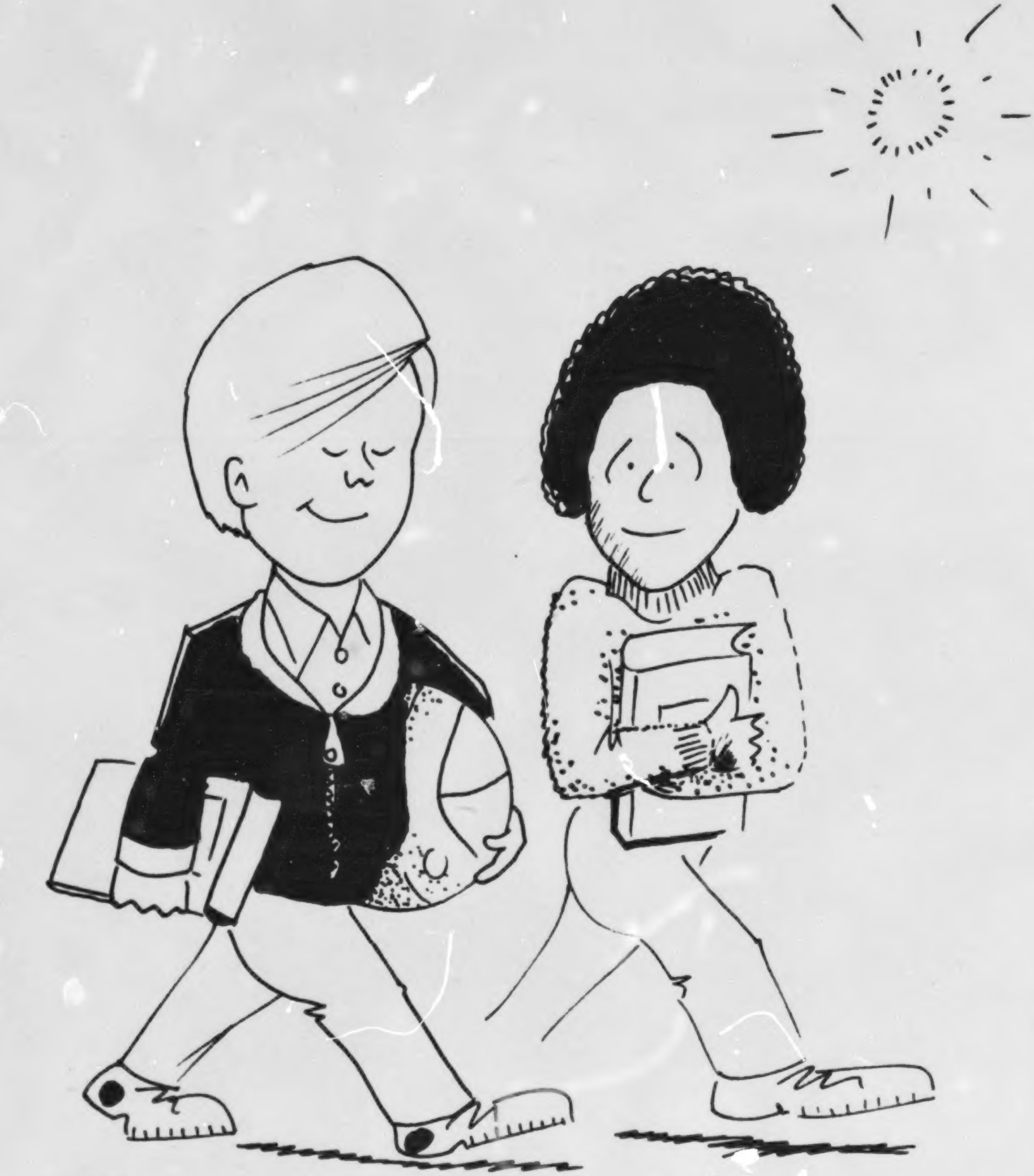
4-6: Have students develop a dialogue between two major characters in their lives that use body power. Have them discuss the dialogues and show ways in which body power is used. You may want them to read the dialogues orally in class.

Math Adaptation

K-1: Ask students to collect a set of pictures that show people using a lot of physical energy and people not using very much body power. Have them sort these pictures into piles and talk about what uses the most body power and what uses the least.

2-3: Have students collect and sort pictures of energy into piles that involve walking, playing, and eating. They can then add or subtract the amount of pictures in these categories and practice important math skills.

4-6: Have students keep track of the body power that they use during the week. They should be able to keep track of how much they walk, for example, in terms of blocks or miles or the number of minutes they spent walking each day of the week. Then have them do graphs or percentages of their total time that they spent using this form of body power.



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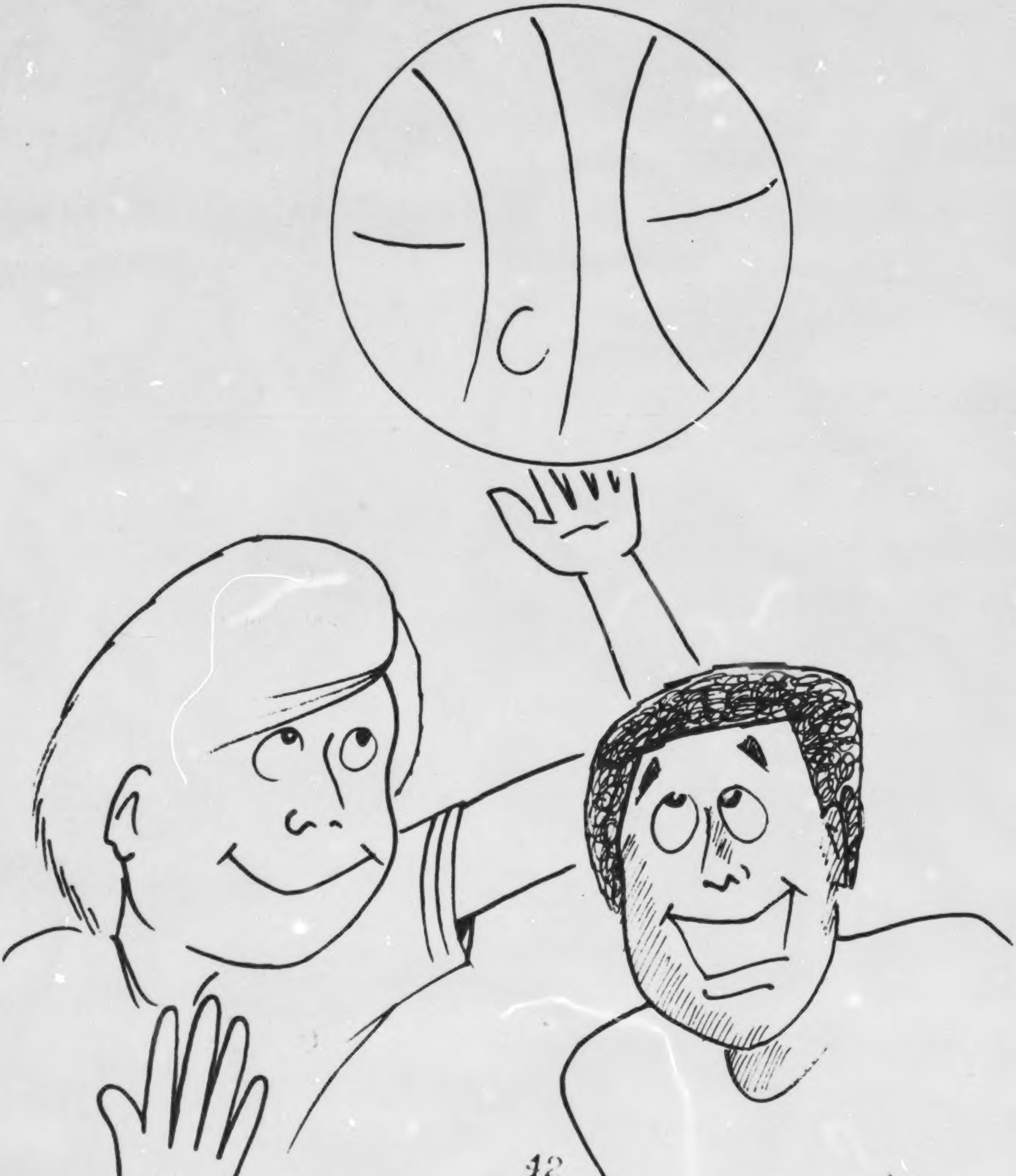

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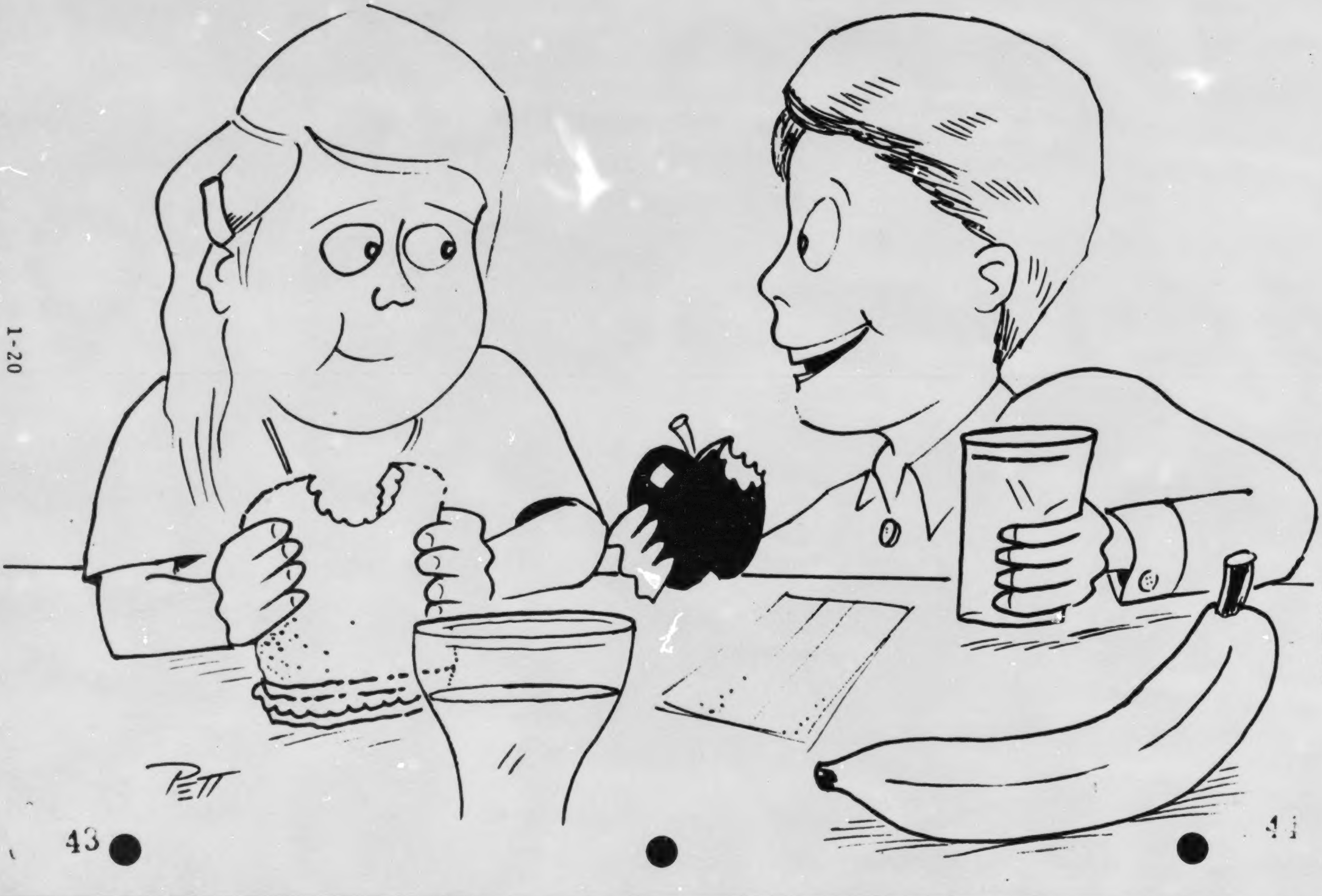


LESSON 1-2: PICTURE 2-3

LESSON 1-3: YOUR FEELINGS

Rationale

Students should now understand human energy or body power. However, feelings are also an important part of understanding human energy. Feelings can bring people together or tear people apart. We can feel tired when we have expressed our feelings alot, either because we are happy or because we are sad. Therefore human energy affects our feelings and our feelings affect our human energy. Feelings are important because of their impact upon a single person and their impact on others around that person.

Objectives

Students will become aware of how feelings are an important part of understanding human energy. This objective can be assessed by students' discussion in Activity E of this lesson and/or by using Assessment Activity 1 at the end of this chapter.

Main Activity

A. Ask students to tell you what happens to them that makes them feel good. Have the class discuss for awhile what things in their lives really make them feel good regularly or occasionally. Students might suggest that a hug makes them feel good, or playing ball makes them feel good, or taking a walk makes them feel good. The purpose here is just for students to see that there are things in their everyday lives that do make them feel good.

B. Discuss with students about how feelings affect their human energy. When they feel good they generally feel like they have a whole lot of energy. When they feel bad they generally feel like they have less energy. How they feel affects what they do every day. Use the pictures that are enclosed with this lesson to talk with students about what feelings they have and why these feelings are important to their understanding of human energy.

Picture 3-1:	Happy. When we are happy we can show it in many ways. We have a lot of energy. It is important because we can do more things and help others more when we feel happy.
Picture 3-2:	Sad. When we are sad, this affects our energy use. We feel bad about something. We often want to be alone and not around other people. We often feel weak when we feel sad.

Picture 3-3: Love. When we express love to someone else, it makes us feel good and we can do good things as a result.

Picture 3-4: Anger. When we are angry, this affects our energy use. We often show that we don't like someone or something.

Picture 3-5: Caring. When we care we try to help other people. This basic feeling affects the way we use our energy. We get involved and try to get something done.

Picture 3-6: Not caring. When we don't care about something, we don't usually act. This feeling keeps us from acting in places where we do not have strong positive feelings.

C. When students understand that they have a range of feelings that affect their energy use, they should either color these pictures or form a collage of feelings that they have every day that affect their human energy. They should talk about things that make them happy or sad or that they do out of love or anger or caring or not caring on an everyday basis. You may want them to draw their own pictures of ways that they usually act when they feel any of these emotions.

D. Have students act out any of the stories that you have been reading to them or develop their own role-playing which shows times when they are happy or sad or show love or anger or caring or not caring. Ask students why it is important that people express these emotions. Basically, without their expression, people would not enjoy things as much or get as many things done. In effect, feelings give us a base for doing things better, with more intensity, and for more enjoyable purposes.

E. Talk with students about what one thing they could do that would make them all feel happy. They might want to play a game, or talk about a particular topic, or see a film, or have you read a story. Do that thing with them in class or on the playground. Then conduct the following discussion.

1. Why are we now happy? (i.e. We like to play games. We can laugh a lot doing this.)
2. What energy did we use in order to be happy? (i.e. We laughed, we smiled, we showed that we care.)
3. Why are feelings important? (i.e. They help us to do things, they help other people to live with us.)

F. Ask students to take an action that they think will help someone else feel happy or cared for. Have them take this action between the time that class ends and the time that class begins the next day. Then have students report to class the ways that they tried to do something for someone that would make that person happy or show that they love that person or care for them. Have the class discuss how feelings are important and how they can help others to have good feelings.

Grade Level Adaptation

2-3: Develop six situations, or pick them from stories students are reading or actions they are taking. Ask students to tell you how they feel about those situations; then hold a discussion on how feelings affect their human energy. Have students collect pictures which reflect those feelings and do something which will help someone else to have good feelings.

4-6: Use students' favorite stories, books, or even comic books to analyze different kinds of feelings that are expressed. Have them discuss why feelings are important. They may want to develop a play showing the expression of different kinds of feelings.

Language Arts Adaptation

K-1: Have students talk about an experience in which they have expressed their feelings. Have them talk into a tape recorder and play back what they said. Ask them what feelings are expressed in their talk.

2-3: Have students write a sentence which expresses a feeling and talk with them about what feeling it is that they have expressed.

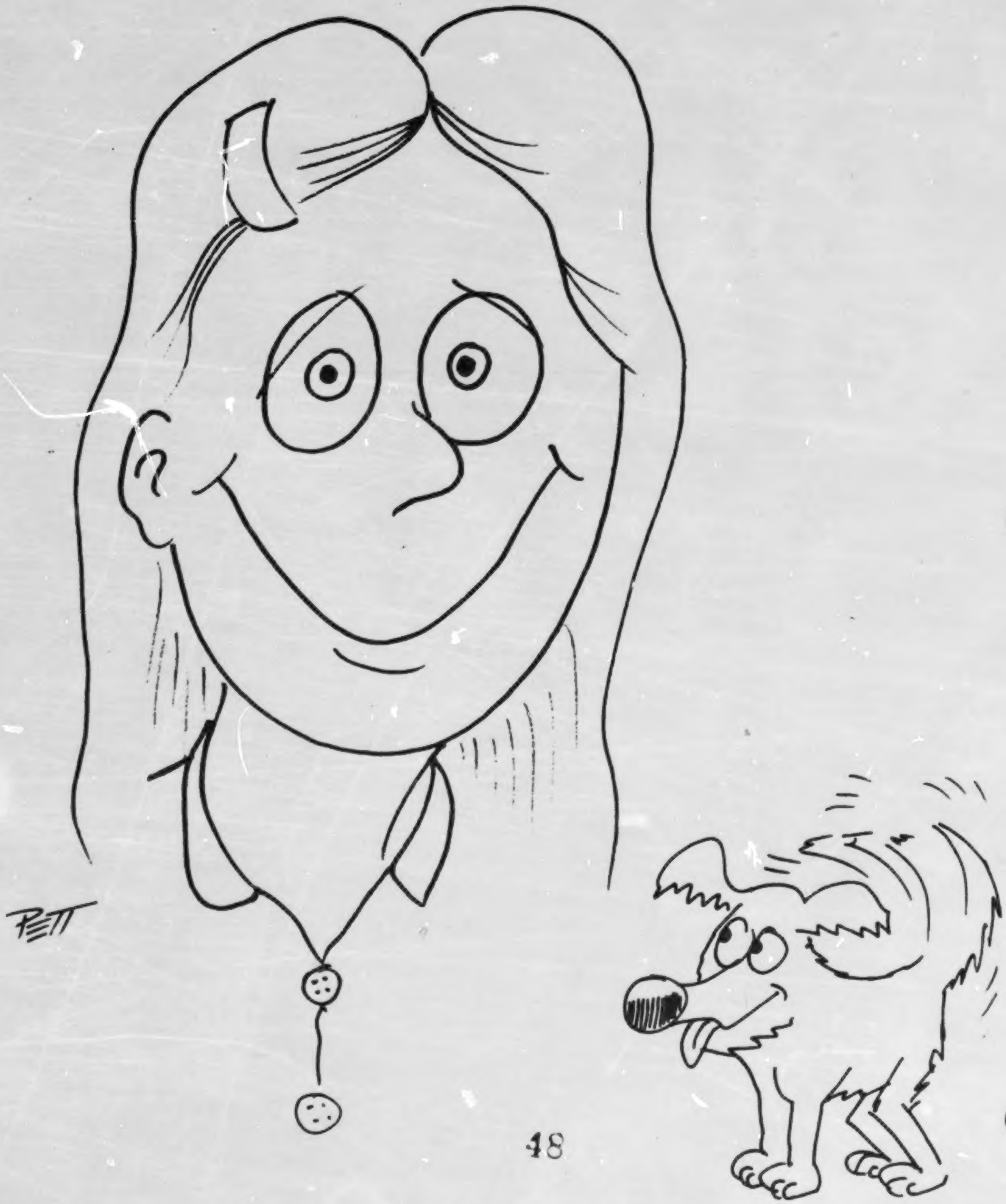
4-6: Have students develop a play which shows a variety of emotions and how they make an impact on themselves and on other people.

Math Adaptation

K-1: Have students cut out a series of hearts and a series of tears. Have them put the hearts on things which represent happiness or love or caring. Have them put the tears on things that represent sadness or anger or not caring.

2-3: Have students use a thermometer to talk about what emotions are stronger than others. For example, have them talk about what makes them very, very happy at the top of the thermometer. Have them talk about what makes them a little happy and what makes them unhappy. They should be able to use the thermometer as a measure for the strength of their emotions about various things.

4-6: Ask students to find a measure of their emotions using any of the math functions that you are currently teaching. Ask them to find a form of expression for love or anger which can be treated mathematically. For example love can be expressed as an addition function as a relationship between two people.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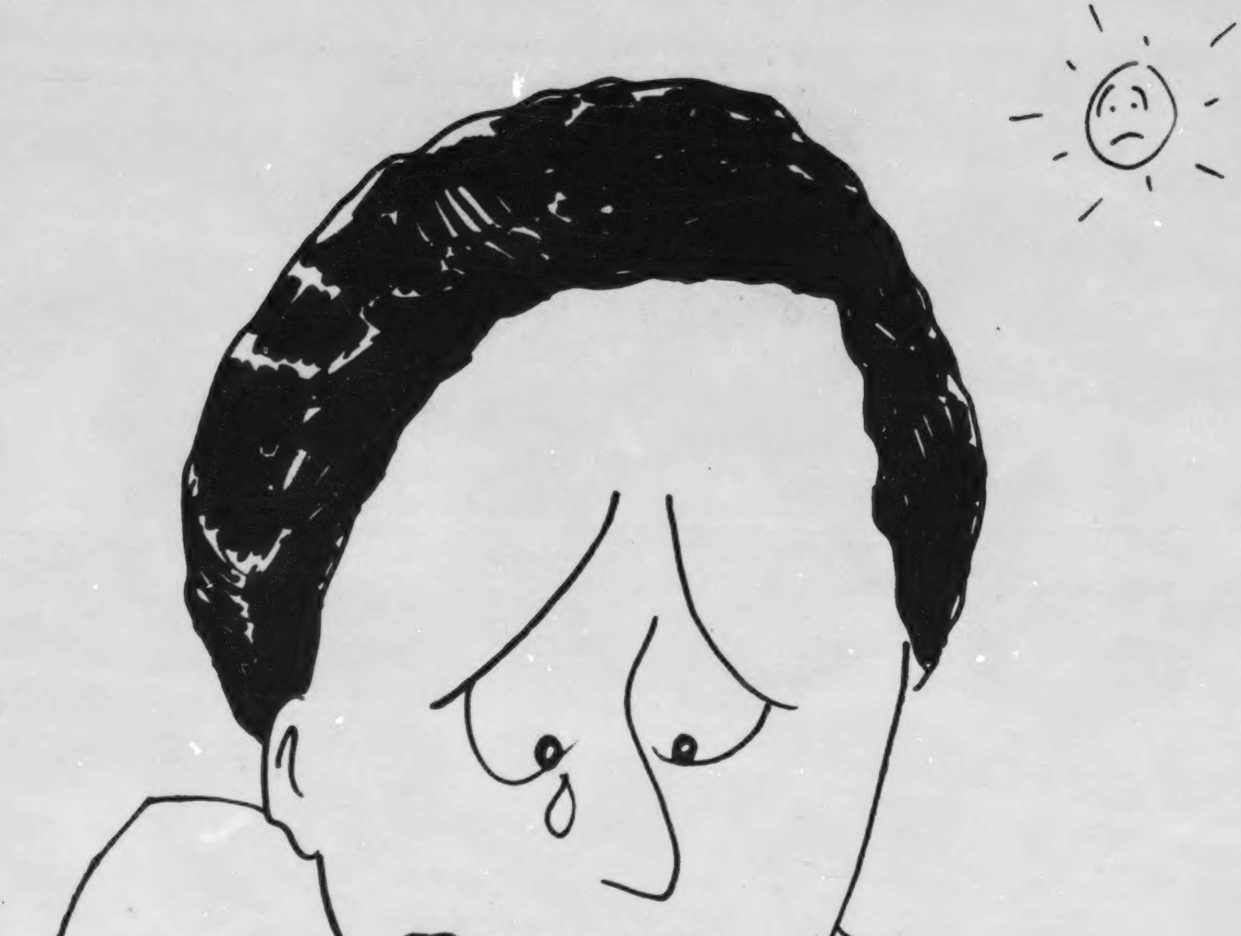
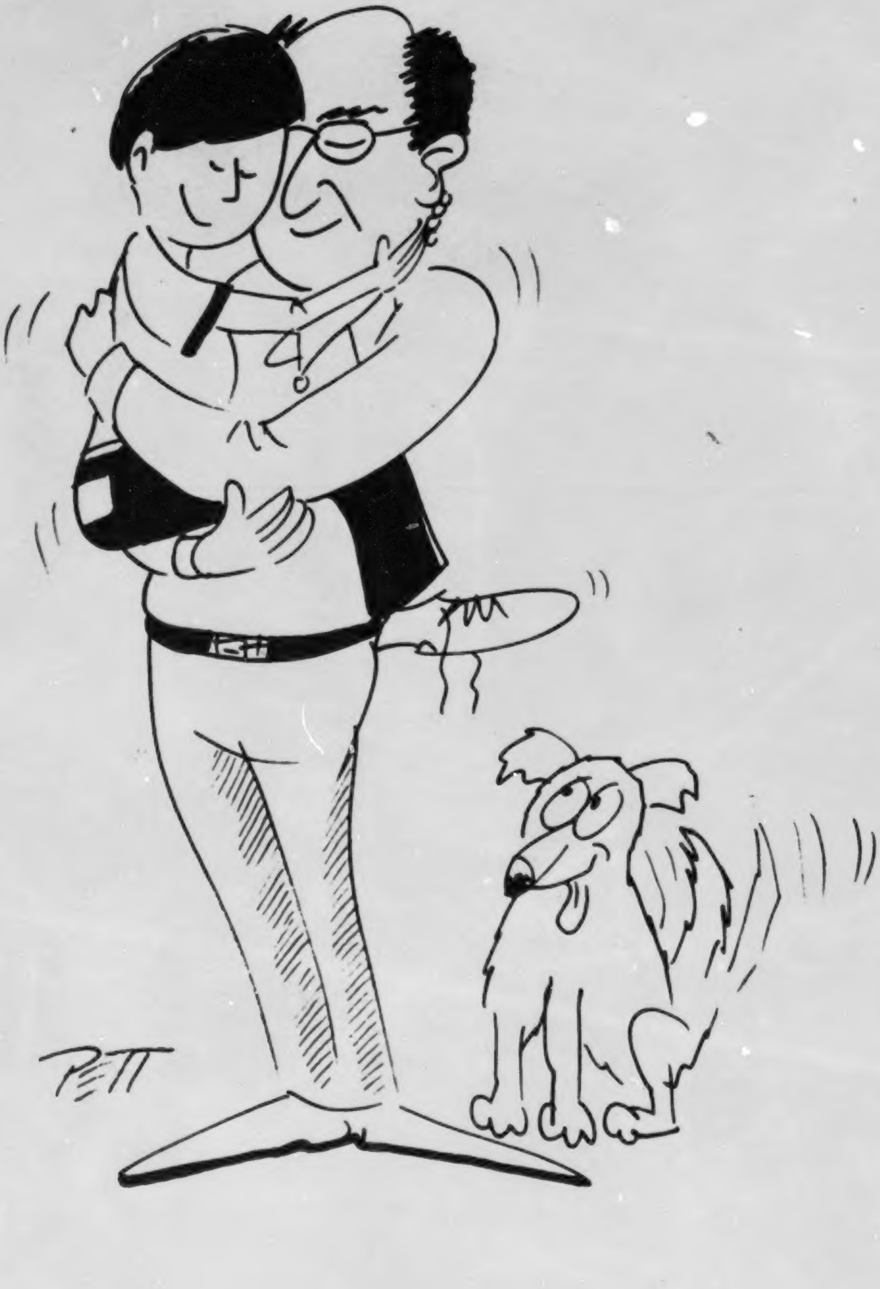
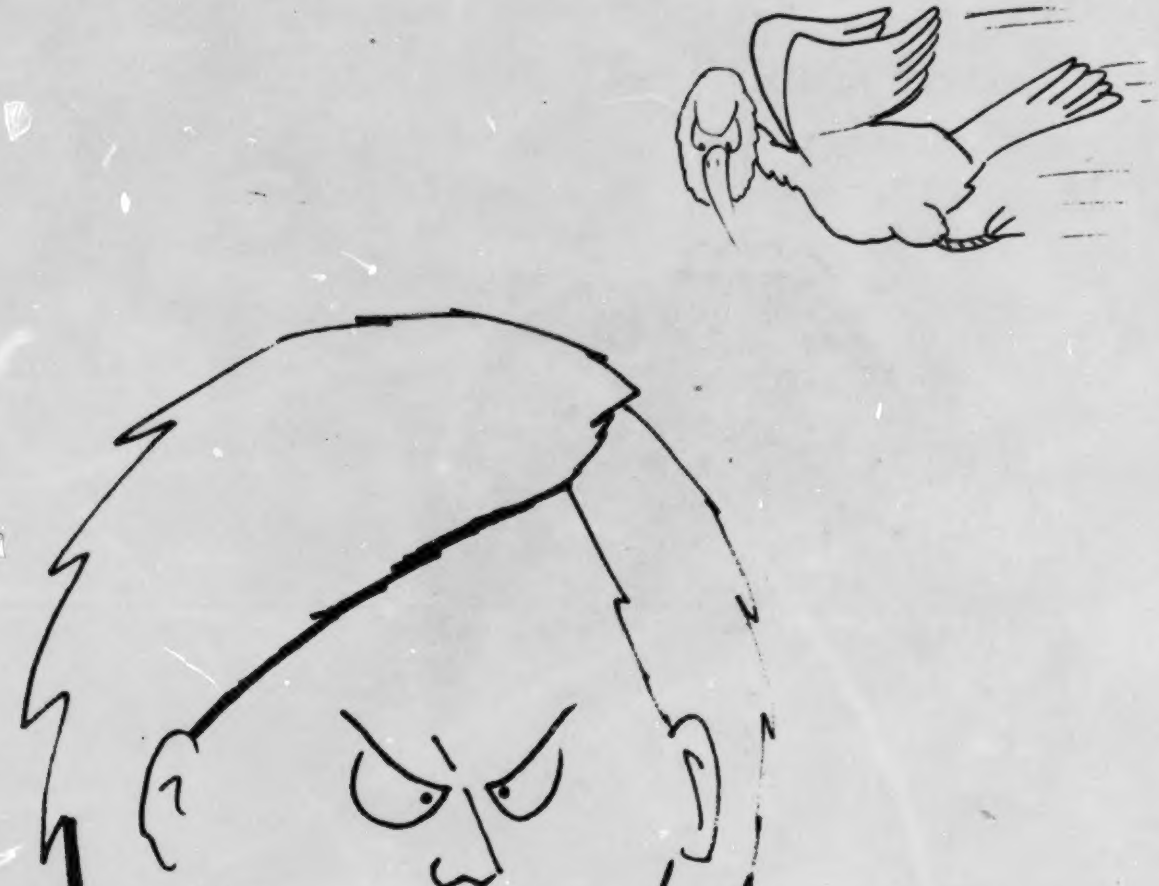
LESSON 1-3: PICTURE 3-2

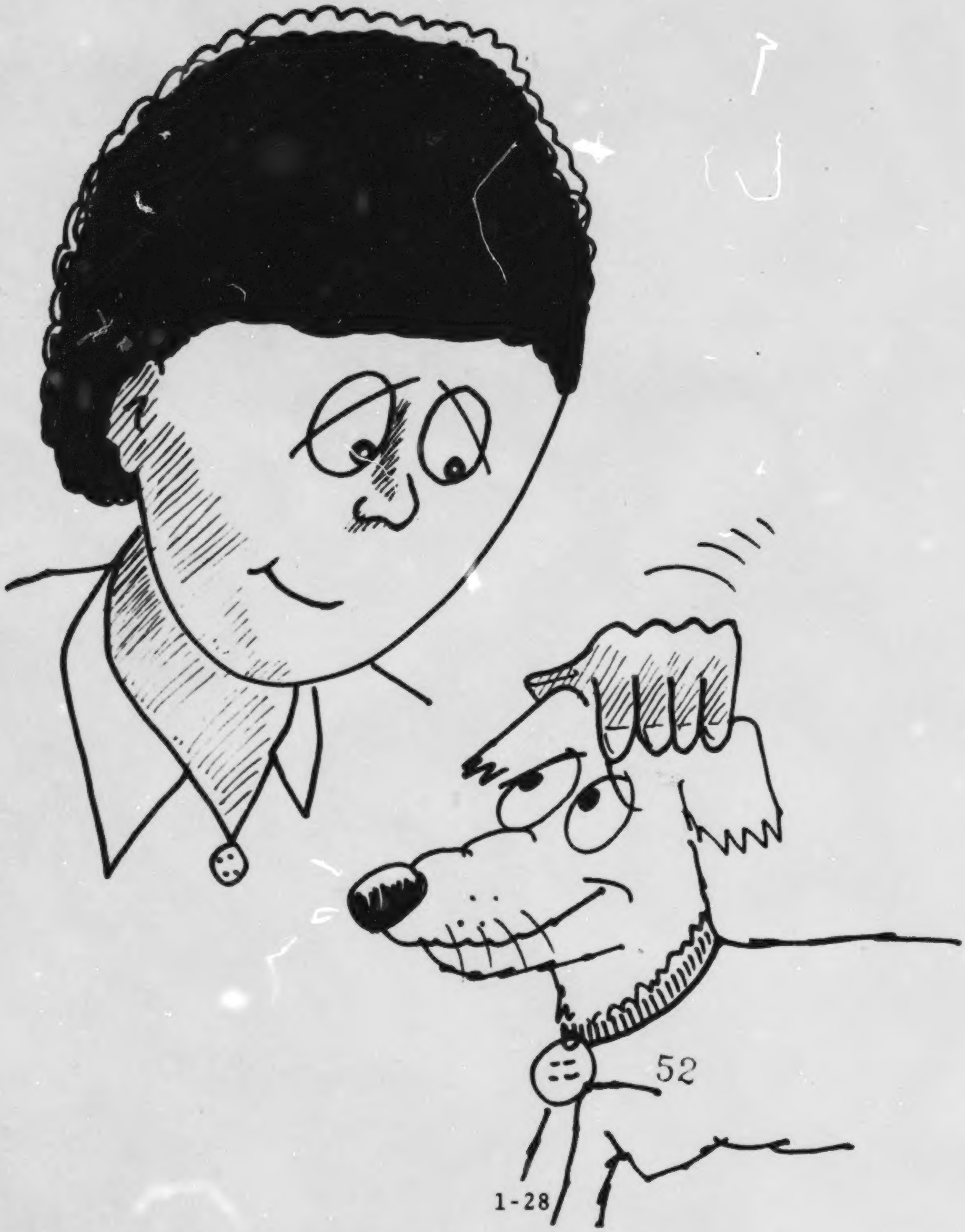


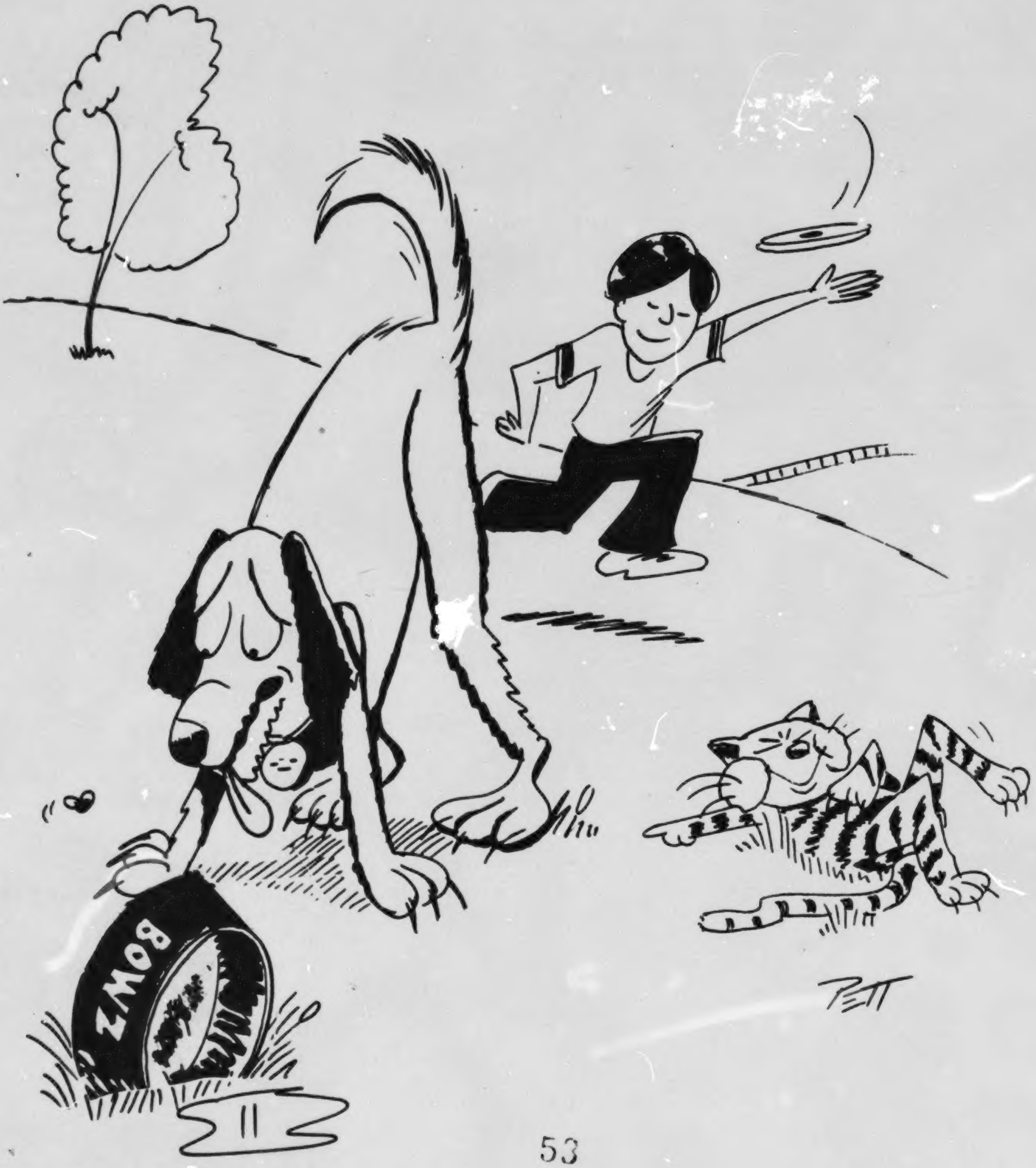
LESSON 1-3: PICTURE 3-3



LESSON 1-3: PICTURE 3-4



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LESSON 1-4: USING YOUR HEAD

Rationale

Just as feelings are related to human energy, so are thoughts. We are concerned here with students recognizing that their thoughts and ideas affect their human energy and that human energy affects their thoughts and ideas. They think every day when they solve problems, both in school and out of school. Our purpose here is to make them aware of the importance of thoughts to understanding human energy.

Objective

Students will be aware that thoughts are an important part of understanding human energy. This objective can be assessed by students' responses to Activity F of this lesson or Assessment Activity 1 at the end of this chapter.

Main Activity

A. Give the students a problem to solve in class. Make it a problem that is relevant to what you are currently doing in class. They might choose as a class what game to play, what story you would read to them, or what activity they would do. Have the class make this decision, then talk with them about how an important part of getting something done is to think about it and to talk about what might be done. At this point, students should just understand that most of the time thinking is an important component of doing anything. Be sure to have the students go ahead and play the game they planned or read the story to them or actually have them execute the activity.

B. Talk with students about how thinking is important to doing anything. Use the pictures enclosed with this lesson to have students identify what people are thinking in the pictures and how thinking affects human energy.

Picture 4-1:	Class. Students think in class. They think of the answer to a question as they raise their hands. They also think about the rules of the games they play.
Picture 4-2:	Home. Students think at home. They think about how to grow a plant and they think about when to water it.
Picture 4-3:	Play. Students also think when they play. They think about how to hit a ball. They think about the rules of the game they are playing.

C. Ask students to think about a particular idea. Tell them not to tell anyone about it, but to draw pictures of what they are thinking about. They should not show their pictures to anyone. Then have students do pantomime with the other students, acting out what they are thinking about. The other students should try to guess what the student is thinking by his or her pantomime. When students have guessed for awhile, the student who is doing the pantomime should show them his or her picture. The students should talk about what thoughts are shown in the picture and how thinking affects and is affected by human energy.

D. Ask students to think about one problem that they solve in class every day. Have them talk about how they think in order to solve this problem. Also discuss with them how they often feel tired when they have thought hard about a problem. Talk with them about how important thinking is. If we could not think, we could not do a great many things.

E. Ask students to think about one problem that they have at home. Have them think about the problem and talk with their parents about the kinds of problems they think about. Have students come back to class and share with the class the kinds of things that their parents think about every day. Stress with students that they think in class and at home, and that their parents and teachers also think about things. All of this thinking affects how students, parents and teachers act everyday.

F. Now have students think about a game that they would like to play. Have them play the game and then talk with them about what they thought about in playing the game and how thinking helped them to play it.

G. Help students to think about how thinking affects human energy. Read a story to them which involves a character in the story thinking about what he or she will do. Then lead a discussion with students asking the following questions:

   1. What was the character in the story thinking about? (i.e. going to school, playing)

   2. Why is it important to think about things? (i.e. We will act more effectively.)

   3. What would happen if we could not think about things? (i.e. we could not solve problems, play games)

   4. How does thinking affect human energy? (i.e. We often get tired after thinking a lot.)

Grade Level Adaptation

2-3: Present students with a problem which is open-ended and ask them to solve it. Talk with them about how they have used thinkings skills in order to solve the problem.

4-6: Ask students to develop a plan in order to solve a problem. They might work in groups on similar or different problems. Make the linkage with them between thinking and doing, and talk about how thinking is important to initiate a action.

Language Arts Adoption

K-1: Put a word on the board. Have students think about how they would spell and pronounce that word. Have them see how they use their thinking skills in any kind of language arts activity you are currently teaching.

2-3: Have students think about a problem and write three sentences which outline their solution to the problem.

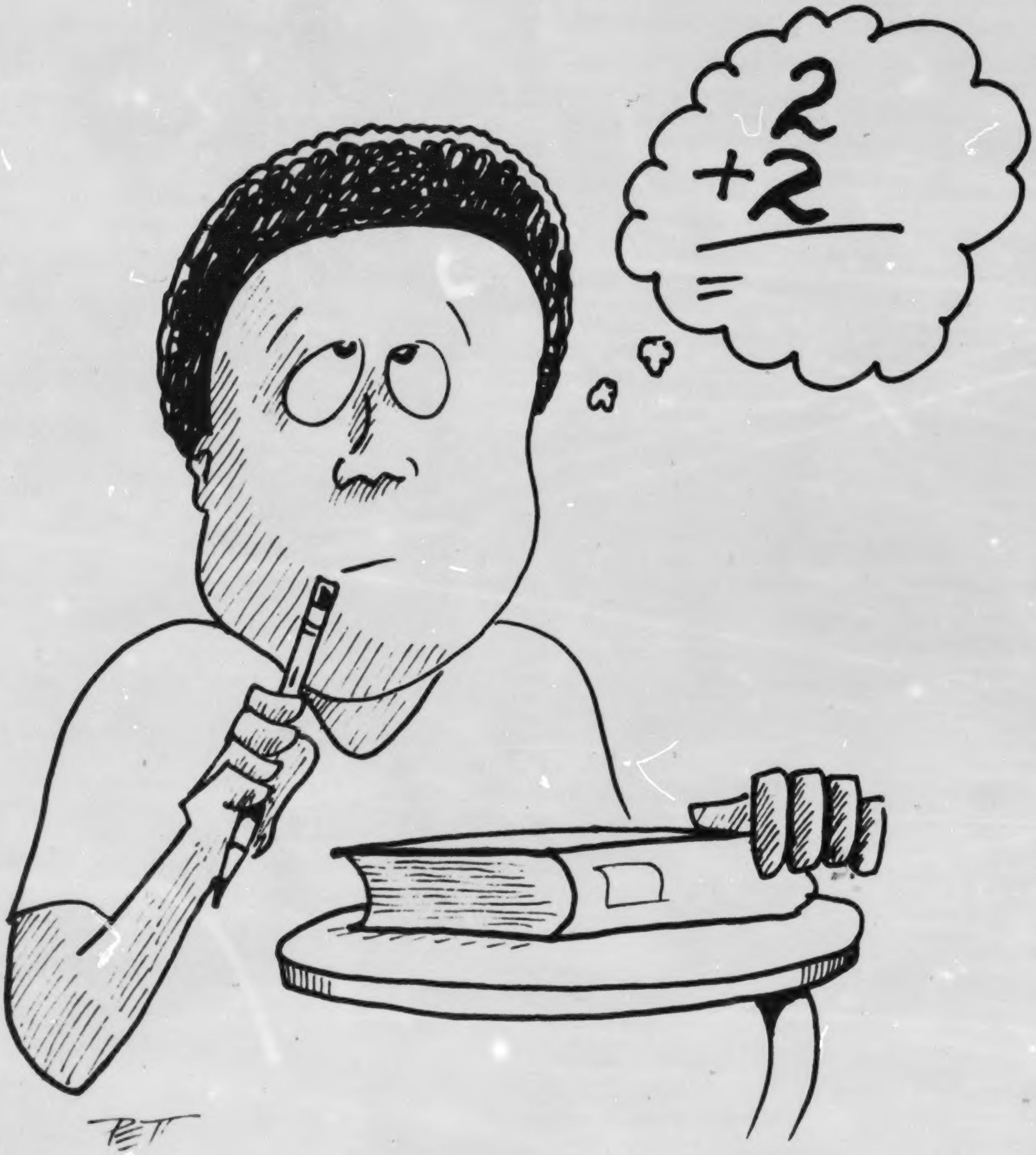
4-6: Have students think about the key elements of writing an essay or a poem or a dialogue. Talk with them about how doing any kind of writing involves thinking about a problem.

Math Adaptation

K-1: In order to show students how thinking affects their human energy, have students count the number of steps it takes to go to reading group and the washroom. Then have them discuss how they could reduce the number of steps. Talk with them about how their thoughts have made their energy use more efficient.

2-3: Give students a problem in addition or subtraction. Ask them questions about what they are thinking about as they are doing the math function. Show them that doing their basic math skills involves thinking.

4-6: Have students think about the steps that they go through in any of the math functions that you are currently teaching. Tell them that doing any math problem that they have done in your class involves thinking. Have students talk about how some math functions require more energy than others.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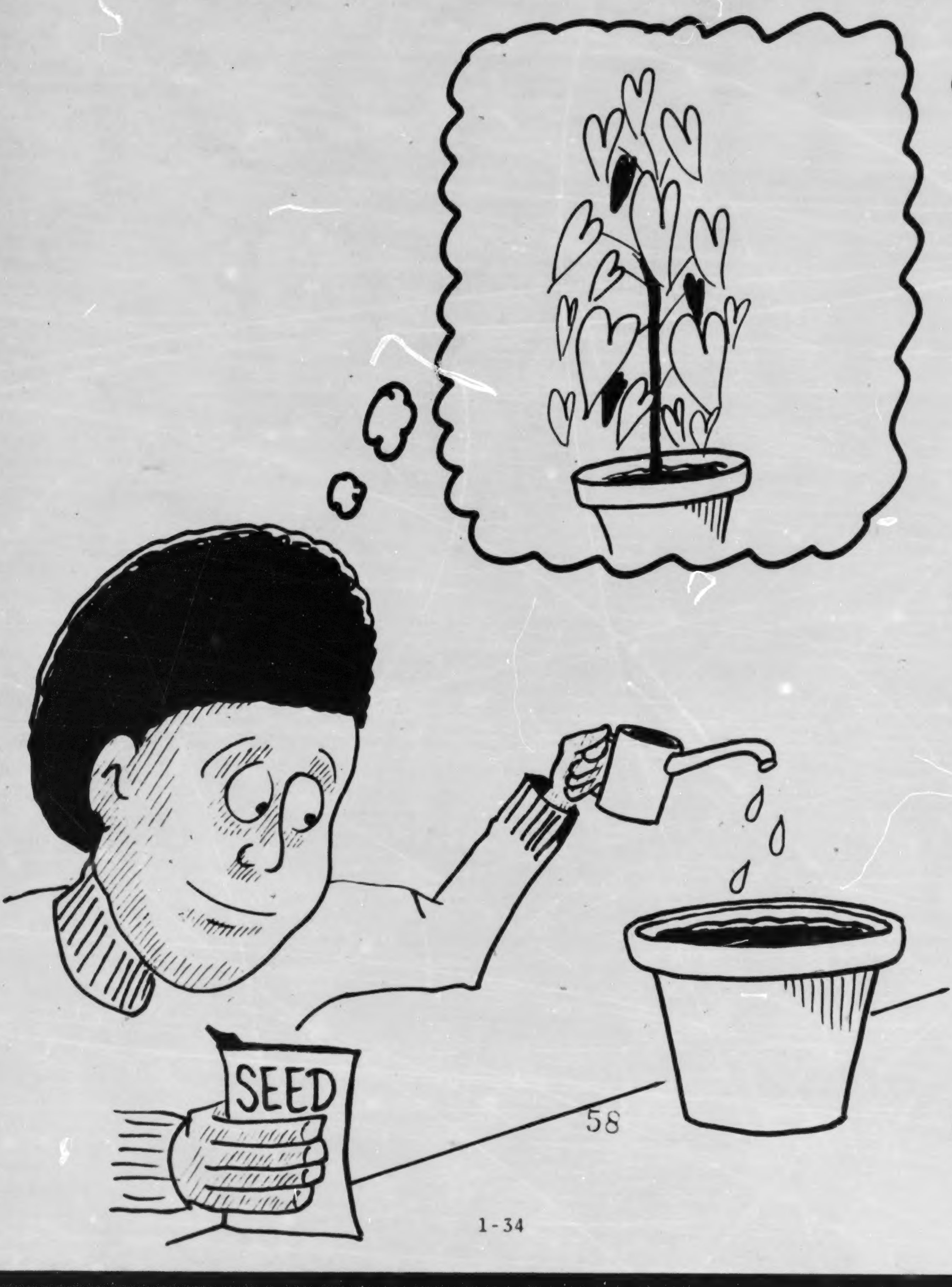
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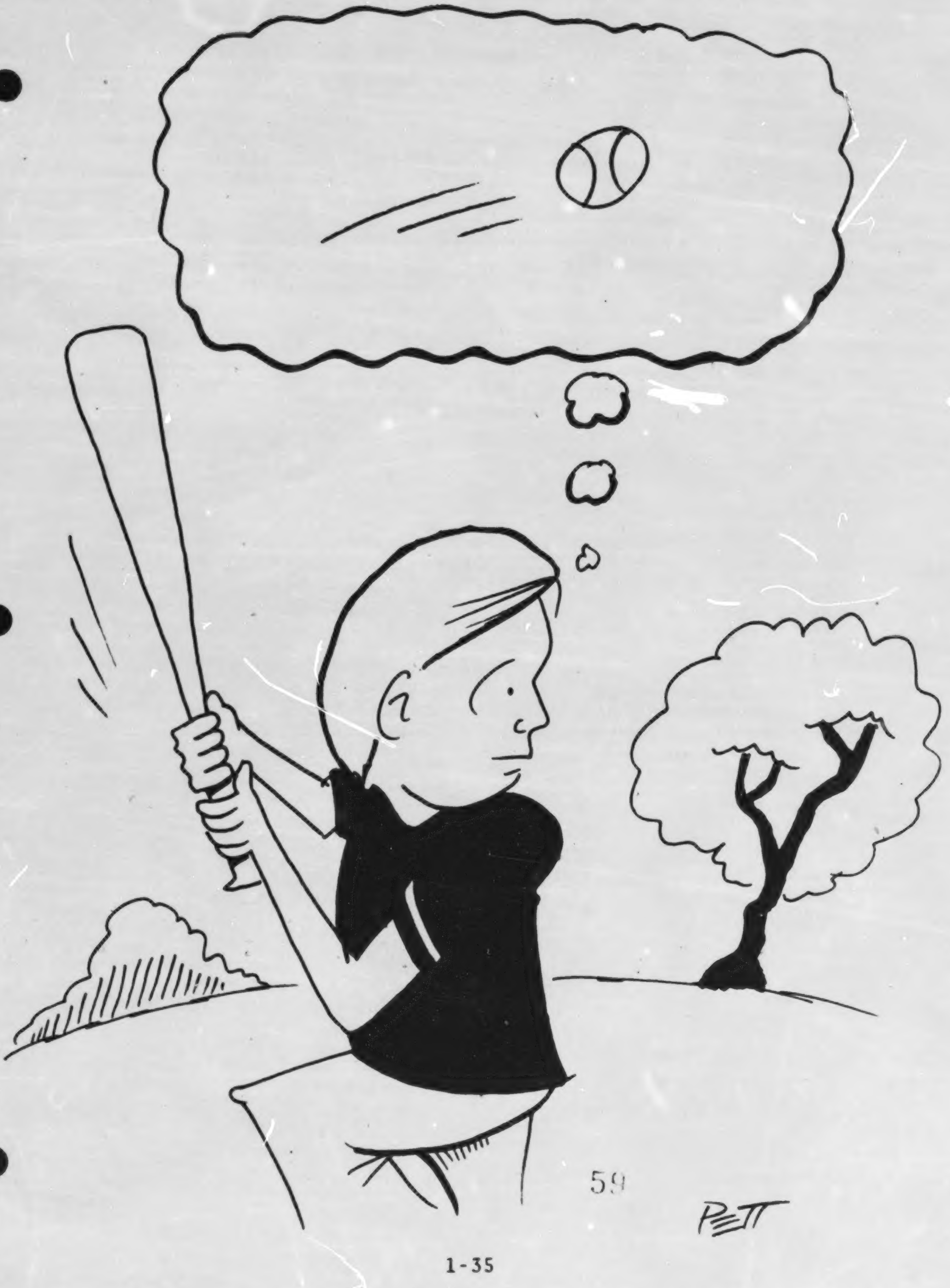

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LESSON 1-5: TAKING CARE OF YOUR ENERGY

Rationale

The purpose of this lesson is to discuss with students the idea that everything needs to be taken care of, including energy. These activities are also designed to introduce the concept of conservation. Students may or may not be aware of the need to take care of, and at the same time develop, sources of energy. The intent is not to discuss the energy dilemma per se, but to expose students to the idea that all things have to be taken care of (conserved).

The idea of conservation is the key to the course. We want students to be aware of this idea in this lesson. Later on, we will expand the idea so that students are knowledgeable about its meaning, have skills that are involved in thinking about conservation alternatives, and develop participation habits that are necessary in order to make conservation work on an everyday basis.

Objectives

1. Students will become aware that everything needs to be taken care of, including human energy. Teachers can assess this objective by reviewing the students' definition of conservation and their application of it to the pictures or collages they have done in Activity E of this lesson.

2. Students will define conservation and discuss the idea that human energy needs to be taken care of, just like everything else. Teachers can assess the attainment of this objective by students' responses to Activity E of this lesson or by Assessment Activity 2 at the end of this chapter.

Main Activity

A. Using some of the objects in your room, such as plants or animals, ask students who takes care of them. If you don't have plants or animals in your room, you could substitute a favorite game, athletic equipment, or anything they can relate to that has to be taken care of. Discuss the care these objects receive, who does it, and what is entailed in taking care of them. Discuss what would happen if we all went home on vacation and forgot to take care of these things. You could also ask students to give examples of toys and games that they use that have to be taken care of.

B. Ask the students how they take care of themselves the way they take care of the plants or animals in the room. "What do we do to take care of our bodies to enable us to use our energy in our work and in play?" Discuss with the students what would happen if we didn't do the things they mentioned to take care of ourselves, such as eating or sleeping. Use an example such as if they were going to run a long race, what they would do to prepare.

C. Relate the idea of taking care of plants, animals, and themselves to something they use in the classroom, such as chalk, crayons, etc. Act out that they just got a note from the principal saying that the amount of chalk and/or crayons they have are all they would get for the rest of the year. Put a small amount of chalk and/or crayons on the desk where they all can see.

D. Ask the students for suggestions as to ways that they could make these items last until the end of the year. Why would they want to make them last? Ask them to draw pictures or make collages of things that they want very much to last for a long time.

E. Define with the students the idea of conservation. Conservation is "the careful use of things so that there will be more for us all to have later." Talk with students about how their pictures or collages show conservation in action.

F. Relate these ideas of conservation to the ideas about human energy they have previously discussed. We need to take care of our body power by sleeping and eating so that we will be strong. We also need to take care of our feelings because they affect our human energy.

Grade Level Adaptation

2-3: Have students take responsibility for taking care of something for one week. Have them discuss how they have taken care of it and why it is important to take care of things.

4-6: Have students do research on one thing which needs to be conserved, how people are trying to conserve it, and why it is important. Have them form groups in order to do this activity. Have them do their reports and actually practice conservation of the things they have identified.

Language Arts Adaptation

K-1: Using one of their favorite stories, have the students point out parts of the story where something or someone is being taken care of. Have the students talk about ways in which their parents take care of them.

2-3: Students could be asked to write down the name of something they use that they are responsible for taking care of. Have them describe what they do to take care of some object or pet and why it is important that they take care of it.

4-6: Ask students to write a report on the conservation of one object and how they might help in its conservation.

Math Adaptation

K-1: Have students cut out a series of circles, triangles, and squares. The circles will represent people, the triangles will represent plants, and the squares will represent animals. Have them collect pictures which fall into each of the circle, square, and triangle categories. Have them talk about how they might conserve the people, plants and animals. Mix up the pictures and have them put them in categories by the shape of the symbol for the category.

2-3: Read the following story to the students, having them answer the questions at the end of the paragraphs:

Darlene had five things in her home she took care of every day. (Give examples of things they can relate to, such as the goldfish, the cat, taking the garbage out.) Her brother Ted also had five things he took care of. Her sister Jo Anne took care of four things. What is the total number of things these people had to take care of every day?

During the summer, Jo Anne decided to go away and visit some friends. Ted and Darlene agreed to take care of the things Jo Anne usually did.

How many things did Darlene and Ted each have to take care of now if they were still to have equal amounts?

4-6: Have the students imagine that they have four boxes of chalk left for the rest of the year. How could they divide up the boxes of chalk so that there would be equal amounts to be used each month? Repeat this process taking away and adding months and boxes of chalk.

LESSON 1-6: YOUR ENERGY PLAN

Rationale

The purpose of this lesson is to help the students become aware that there are ways that they can take care of their human energy. They will become aware that their human energy depends on taking care of their bodies, their emotions, and their minds. They must take care of their bodies because bodies provide human energy and take care of their emotions and their minds because these direct human energy. They will also find a way to act based on their awareness.

Objective

Students will become aware of ways that they take care of their human energy. Assessment of this objective can be obtained by students' responses to the summary exercise in Activity E of this lesson.

Main Activity

A. Write the words "Human Energy" on the board. Review with students how their bodies, feelings and thoughts are an important part of understanding human energy. Talk with students about how they can take care of their human energy. They need to take care of, or carefully use, or conserve human energy in the same way they would any other form of energy. By the end of the discussion, students should have a general idea of how they think they take care of their bodies and how the condition of their bodies affect their feelings and their thinking on an everyday basis.

B. Now explore how students can take care of human energy in depth. Students can take care of body energy in at least three ways. First of all, they need to eat, to eat good food, and to be sure they have appropriate food energy. They also need to sleep. They need to sleep well, and as many hours a day as they need in order to feel good when they are awake. They also need exercise. Sometimes they get this exercise by playing. Other times they engage in team sports or other types of individual exercise habits.

Use the two clocks in the pictures attached with this lesson that include the pictures of food, sleeping and exercise in order to work with students on an in-depth study of the possibility of taking care of their bodies through these methods. You may want to put the clocks on transparencies so that the entire class can use them or may duplicate them so that they can be used individually.

Look at the clock for the "day" and talk with students about when they eat and when they sleep and when they exercise. Have the students color in the pictures during the time of day that they do these three things. Then talk with students about how eating is important at least twice during the day - at breakfast and at lunch - and how it is important to have good food habits at breakfast and at lunch. Talk with them about how sleeping during the day may be important in order to save body energy. Exercise is always important on an everyday basis. Students should realize how they can take care of their bodies during the day and how they might practice good habits of taking care of their human energy.

Next use the clock that is marked "night" and have students go through the same exercise. They should color the times that they eat, sleep and exercise from six in the evening until six in the morning. Most students will sleep most of this time. Here you should talk about the importance of good sleeping habits. Again, students should realize how they can take care of their bodies during the evening hours.

C. Now use the same system to explore with students how they can take care of their feelings. Talk with them about four of the feelings that they have discussed previously. Those are being happy, angry and sad, and expressing love. Use the day and night clocks with the symbols for anger, sadness, happiness and love to go through the day with students and talk with them about when they have held each of these feelings. They should color the appropriate symbols for when they have had these feelings during the day. Talk with students about how angry and sad feelings affect their body power (e.g. When they feel sad, they are tired.) People who have more happy and loving feelings than angry or sad feelings during any given day have more body power.

If you wish to extend this exercise, go ahead and use the night clock in order for students to see how they feel. You might explore students' dreams in terms of what they remember of what they dream during their sleep. People who are happy in their sleep have more body power.

D. Use the clocks that are provided to talk with students about their thoughts. Remind students that they learned about how they use their thinking in class and at home and at play. Tell them it is important to think sometimes at different periods during the day. Use the clocks to talk with students about things they thought about in class, at home and at play. Have them color in the symbols for class, home, and play on the clocks just as they did for

You may want to extend this lesson to include the evening hours by using the night clock which is provided.

E. Now draw a very large clock either on the blackboard or on a piece of large paper. Have students put on the big clock more things that they do every day that use their bodies, feelings, and thoughts. Guide a class discussion to review what students have learned, with the following questions:

1. What kinds of human energy are illustrated on our big clock? (i.e. running, playing)
2. How is human energy affected by our feelings and thoughts in our examples? (i.e. running involves human energy, where we run is affected by our thoughts, and whether we like it is affected by our feelings.)
3. Why is human energy important? (i.e. It helps us do almost everything)
4. Why is taking care of human energy important? (i.e. We can do more, do it better)

F. Ask students to select one aspect of their human energy that they want to take care of. Have them try to take care of it as best they can for some period of time, such as a day or a week. When the students have completed this activity, talk with them about what they took care of and why it is important to continue to do so.

Grade Level Adaptation

2-3: Have students add more dimensions to their clocks, perhaps in five to ten minute intervals. Have them make a plan for how they might take care of their energy in a 24-hour period.

4-6: Have students keep logs of ways they use their human energy for a week. Then have them make a list of ways they would try to take care of their human energy. Ask them to implement their ideas during the remainder of the class for the semester or for the year.

Language Arts Adaptation

K-1: Have students act out different times of day and what they do that uses their human energy.

2-3: Have students construct a diorama of a period during the day when they are using their human energy.

4-6: Have students work in groups. They should construct a play. The play should reflect different times of the day and the group should create dialogue and act out ways in which they use their human energy.

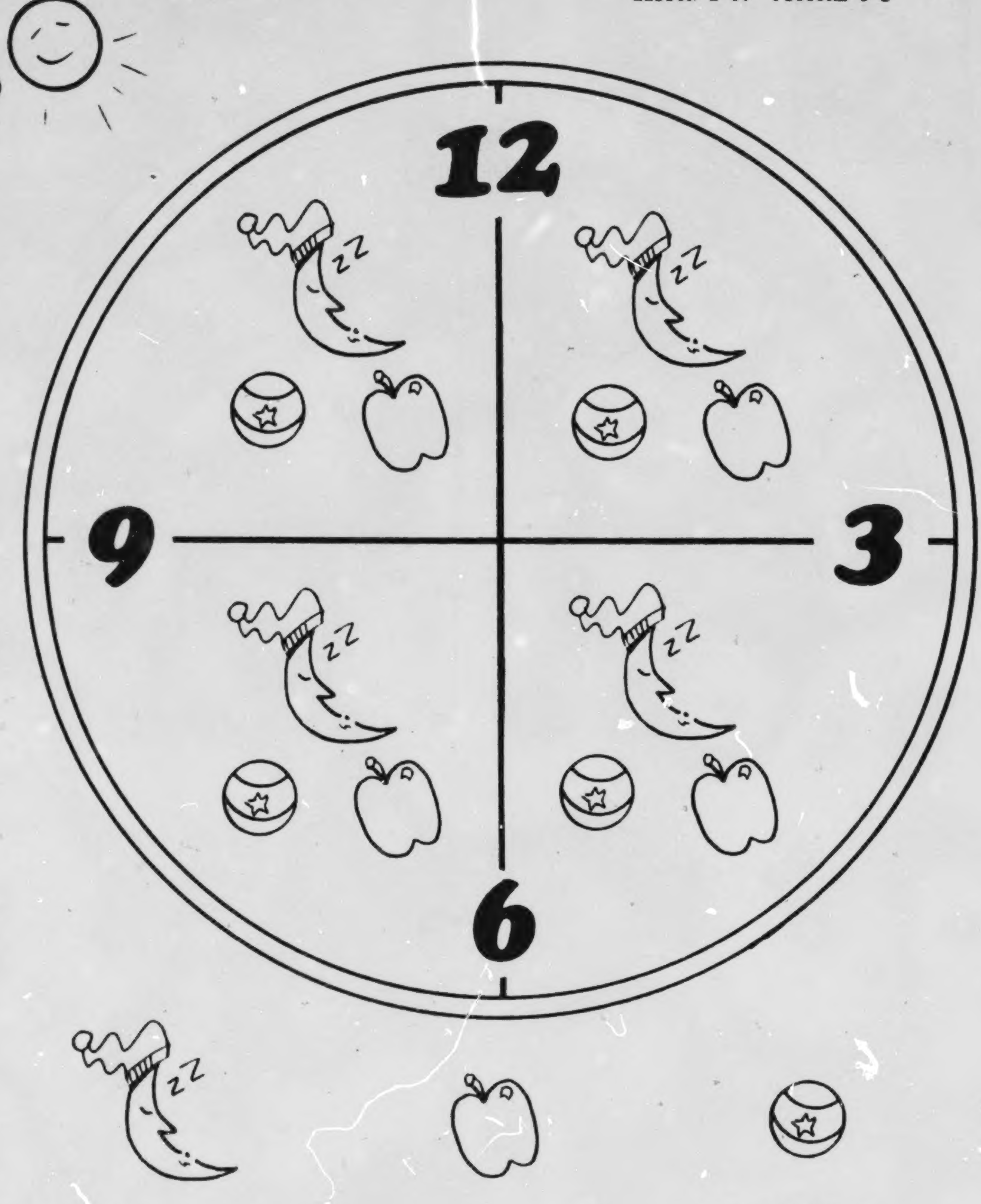
Math Adaptation

K-1: Use the clocks that are part of this lesson to help students to learn a little more about time and how to read a clock.

2-3: Have students compute the minutes or hours that they eat, sleep, or exercise to take care of their human energy for a day or a week.

4-6: Have students chart the times they use human energy for a week. Have them make graphs of their use of this human energy, or have them compute fractions based on how much of a day or a week they use different aspects of their human energy.

LESSON 1-6: PICTURE 6-1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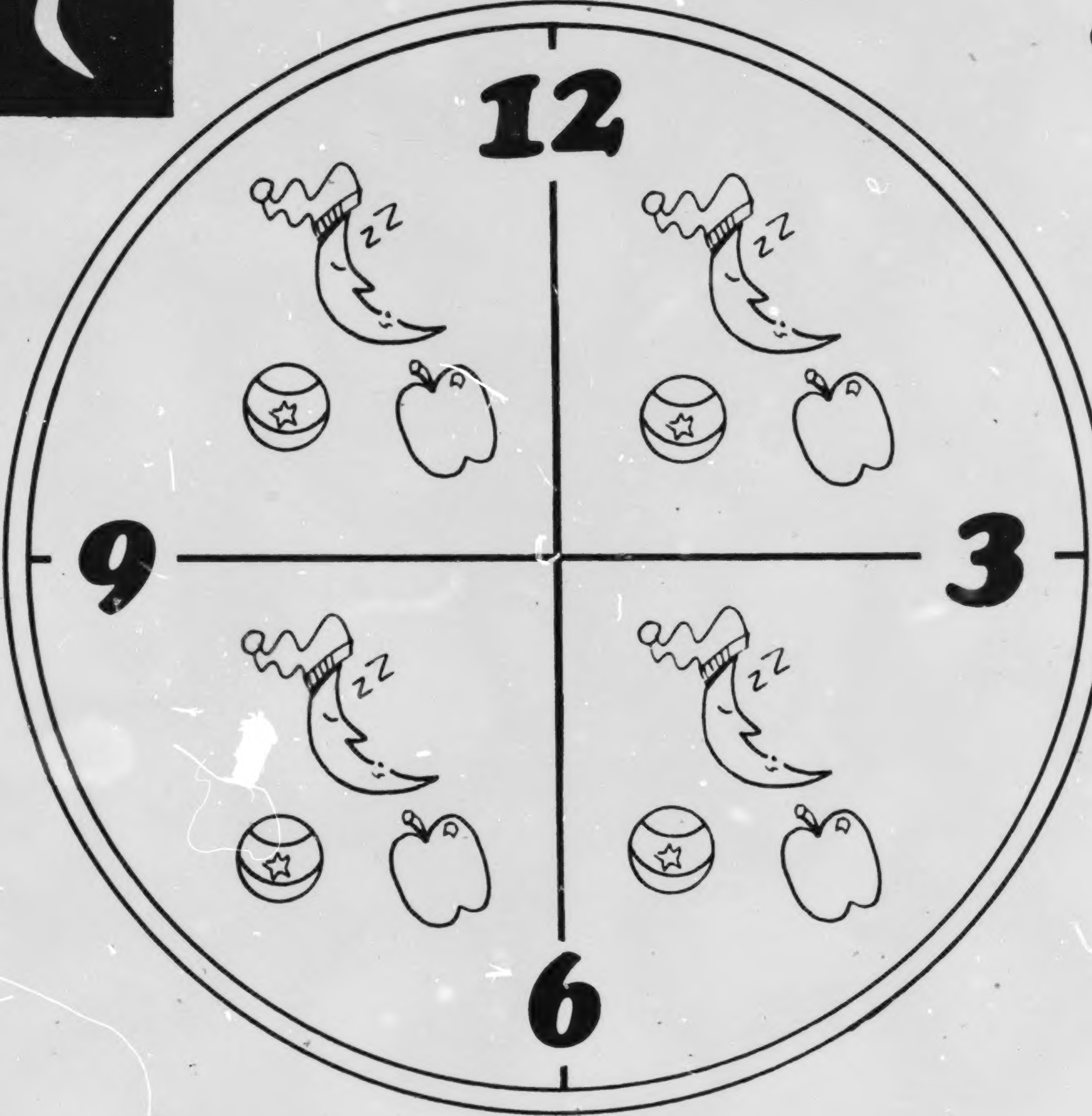
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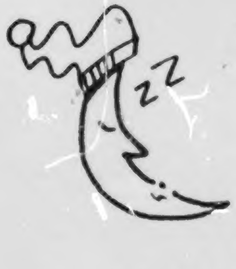

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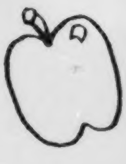

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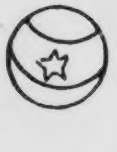
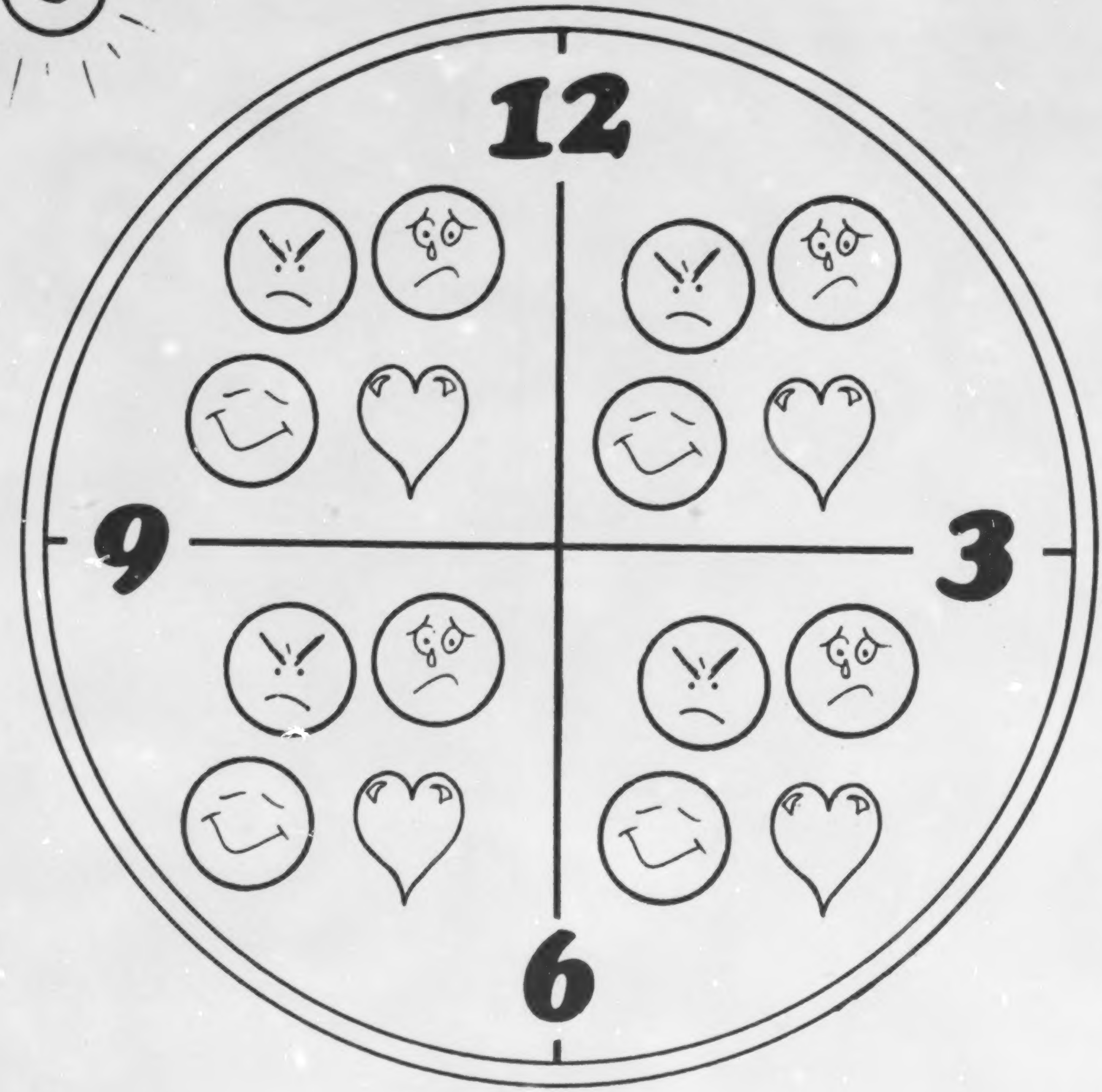
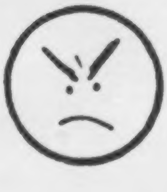


PLAYING

LESSON 1-6: PICTURE 6-3





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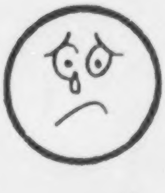

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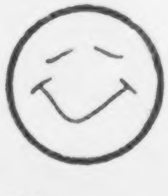

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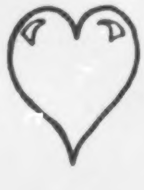
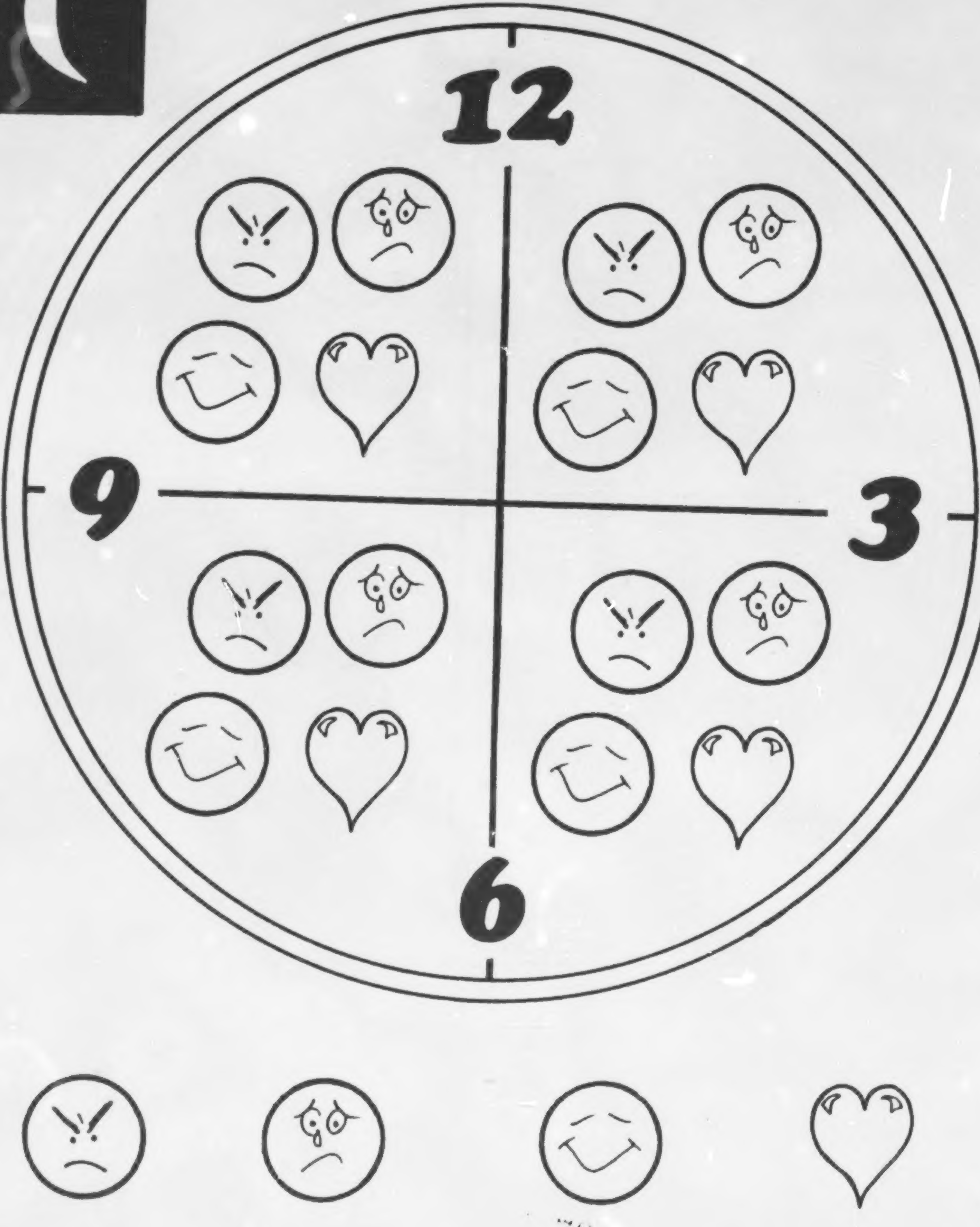
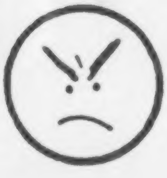


LOVING

LESSON 1-6: PICTURE 6-4

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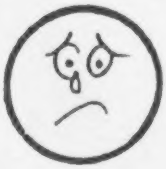
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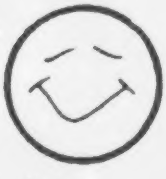
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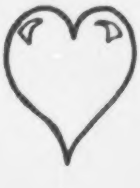
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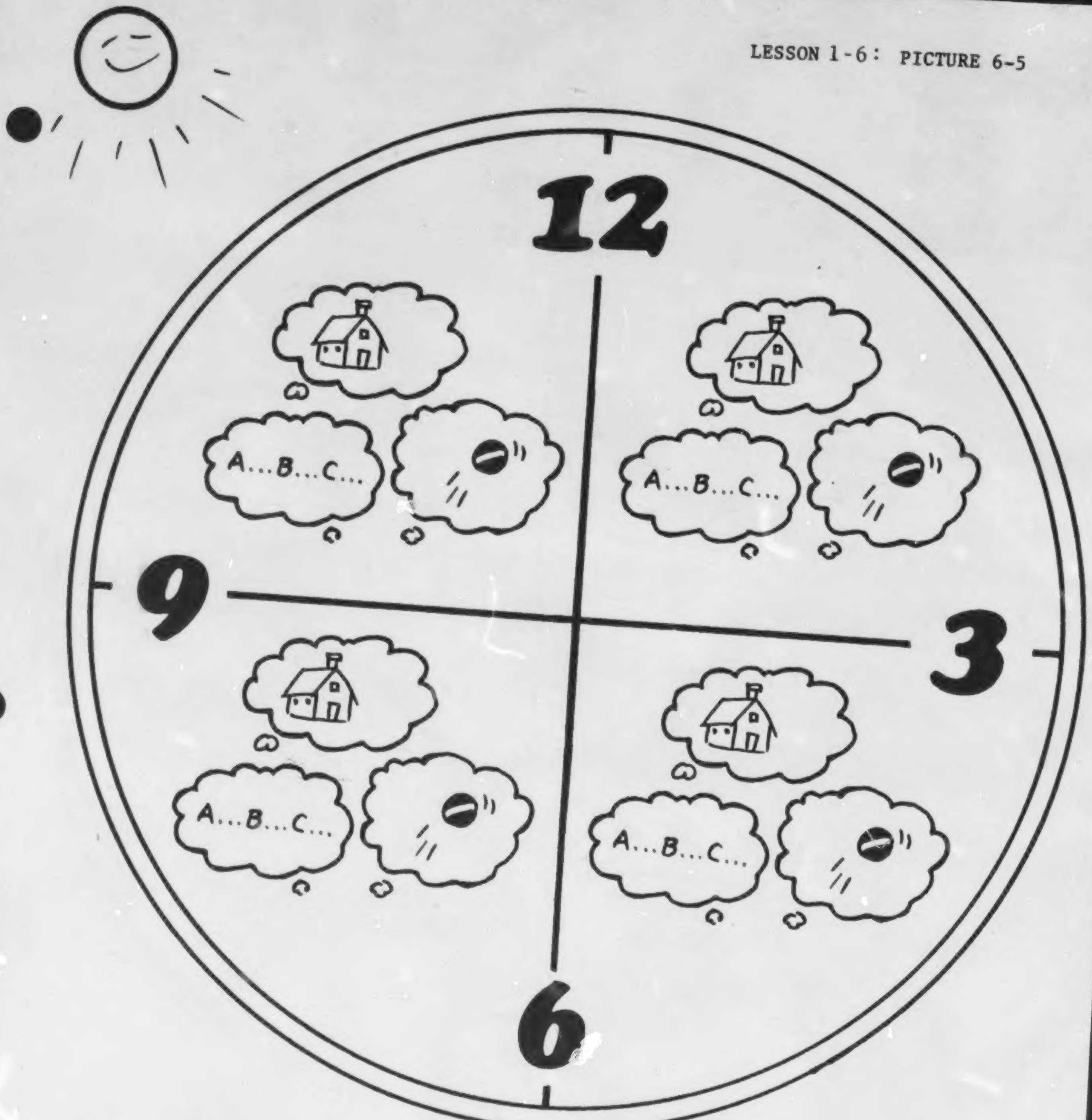
LESSON 1-6: PICTURE 6-5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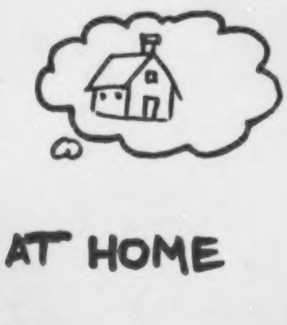

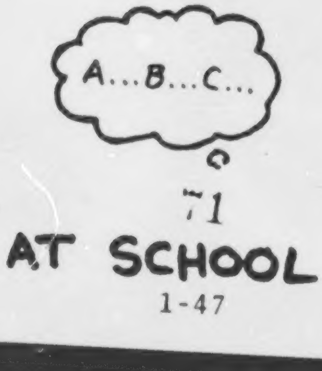
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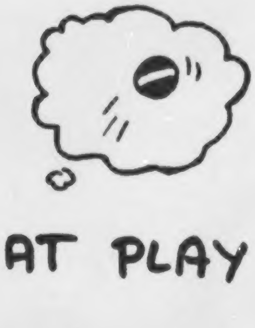

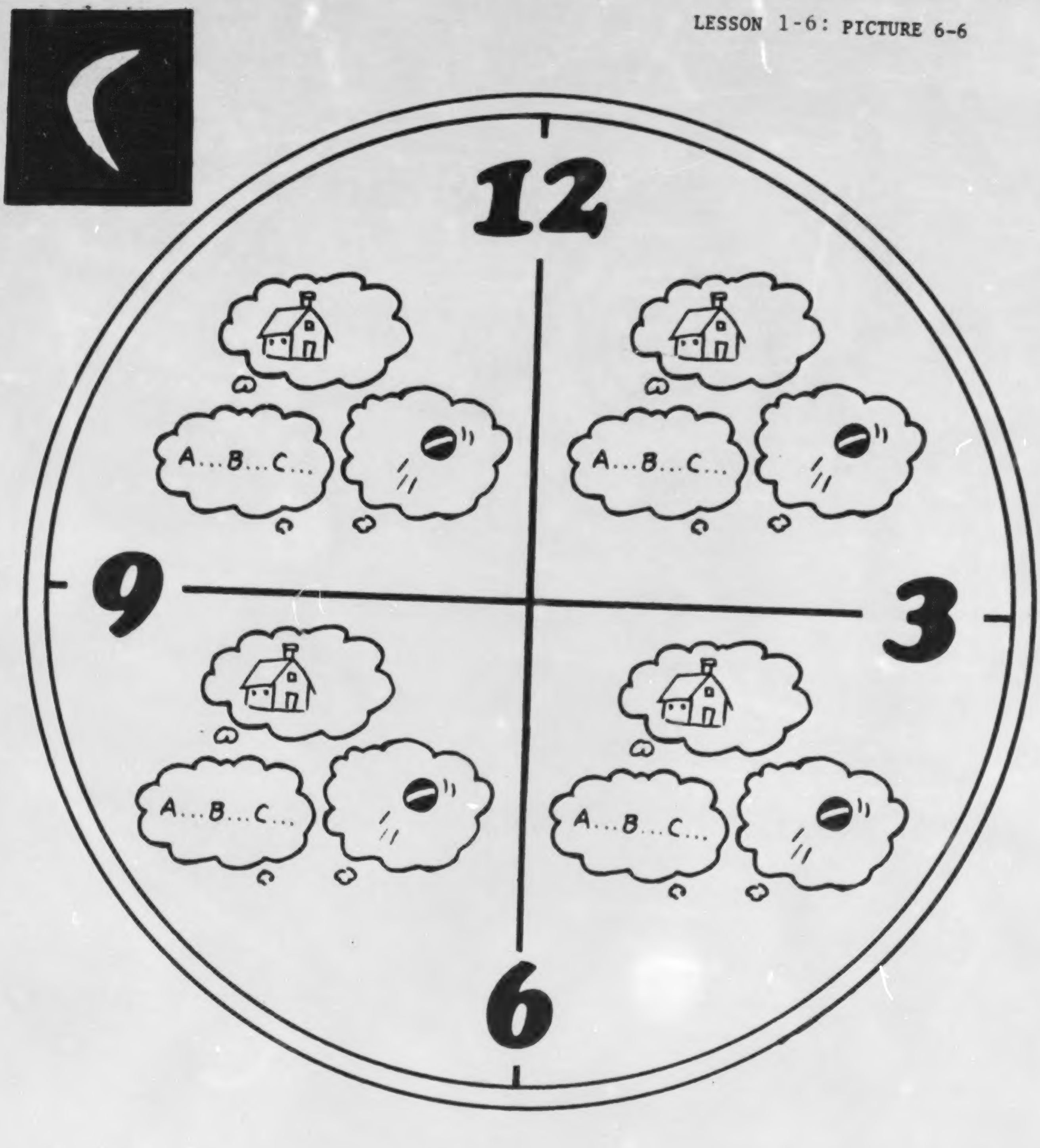
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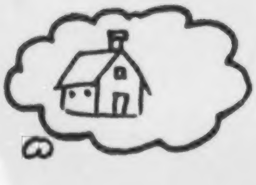
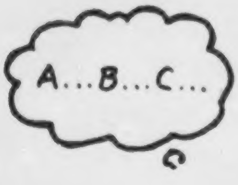


AT HOME



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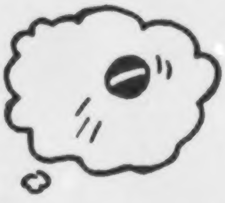


AT PLAY

ASSESSMENT ACTIVITIES FOR CHAPTER ONE

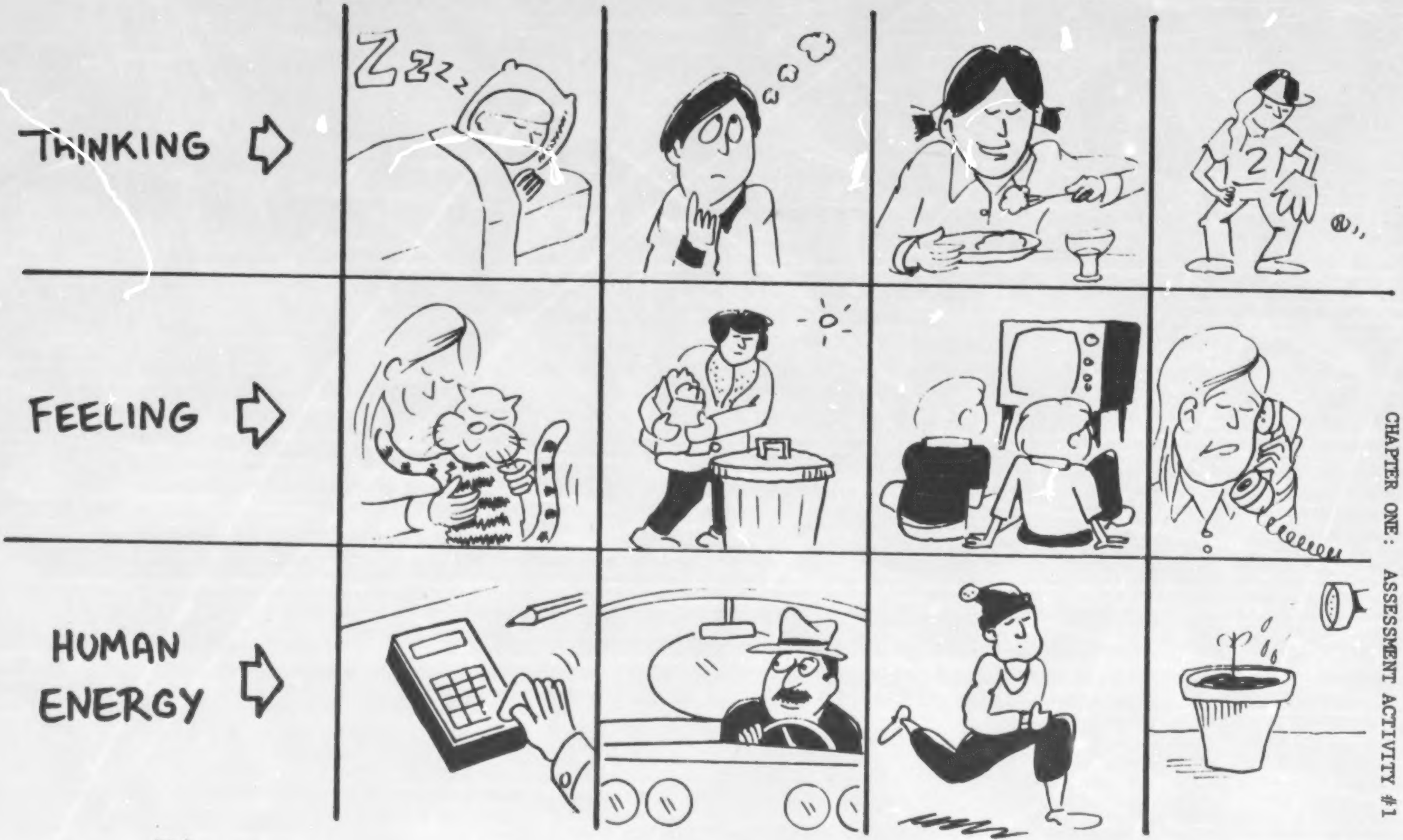
The following assessment activities are designed to review, reinforce, and determine the basic awareness the students have obtained from the lesson in Chapter 1. They can be used immediately following the appropriate lesson or at the end of the chapter.

Assessment Activity One

Students should be able to look at the pictures and select the correct picture or pictures in each group. They should be able to say what people are doing that involves their human energy, their feelings, or their thoughts.

Assessment Activity Two

This activity is designed to review the idea of conservation. Students should be able to see how the people in the house in the picture are carrying out conservation activities or taking care of human energy. They should be able to list at least ten different ways people in the picture are engaging in human energy conservation.


THINKING
FEELING
HUMAN ENERGY
Zzzz
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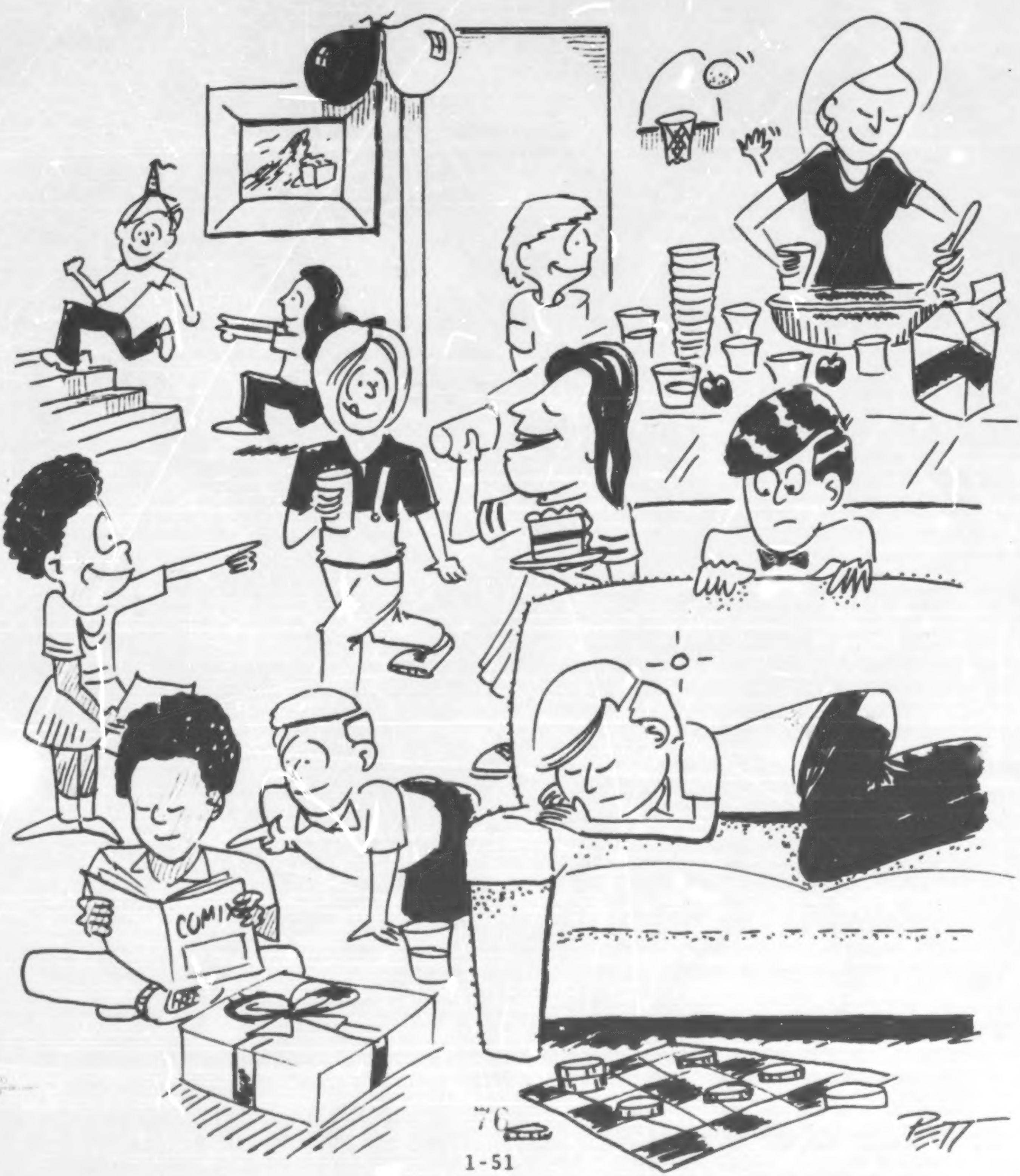
CHAPTER ONE: ASSESSMENT ACTIVITY #2



CHAPTER TWO: ENERGY AT HOME AND IN SCHOOL

Rationale

The purpose of this chapter is to help students to become aware of energy products in their environment, especially in their class, school, and homes. These environments should be the most directly related to their own everyday lives. We will try to make students aware of the vast array of energy products that they can find in their environment, and how these products need to be taken care of in the same way their human energy needs to be taken care of.

Our duel purpose here is to promote awareness. However, we are also concerned about students' knowledge about basic energy products. They will also learn some fundamental skills and how to ask questions so that they can inquire about their environment in more systematic and useful ways. Finally, they will have an opportunity to see how they can take care of energy and energy products that are around them every day.

Objectives

1. Students will be aware of energy products around them (Lesson One).
2. Students will be able to recognize energy products in their classroom (Lesson Two).
3. Students will be aware of the use of energy products in the school environment (Lesson Three).
4. Students will extend their awareness of products through a study of their homes (Lesson Four).
5. Students will develop skills in asking questions related to the energy problem (Lesson Four).
6. Students will be aware of the uses of energy products in their homes (Lesson Five).
7. Students will be aware of actions they can take regarding energy problems and will apply their awareness to actions in their homes and at school.

LESSON 2-1: ENERGY PRODUCTS

Rationale

Energy can be defined as the ability to heat, light and move things. Because this concept is difficult for students to comprehend, here we will focus on energy products and how they are used. We will focus on two key ideas about energy products. One type of energy product is that which uses energy, such as a dishwasher or refrigerator. A second type of energy product is that which is made from energy sources or is made using energy sources. Tables are made from wood; clay pots are made using heat.

This first lesson will introduce students to the idea of energy products. It is important for them to learn this idea as a basis for further study. Without some basic conceptualization of energy products, they will not fully comprehend energy problems and how they can act on them.

Objectives

Students will be aware of energy products around them. Teachers can assess student attainment of this objective through the application that students make in Activity F of this lesson.

Main Activity

A. Review with students how they use their human energy every day. Talk with them about how they use their body power and how their thoughts and feelings affect their body power. Ask students to think about a TV program they watched recently. Help them to describe how the characters in the programs used human energy. Everyone should have a chance to talk about their favorite TV character.

Now talk with students about how the TV is an energy product. Ask them whether they think the TV uses non-human energy. They should say that the TV is plugged in and uses electricity. Because it uses energy, the TV is an energy product.

Now put the words "Energy Product" on the blackboard or a big sheet of paper. Ask students what other things besides TV use electricity in their homes or classroom (refrigerator, dishwasher, ovens, clocks, lights). They should have a long list of energy products, but it need not be comprehensive at this point. Talk with students about how items on their list are energy products because they use electrical energy. You may want to talk about items which use other forms of energy (i.e. wind, water, wood, coal, oil) but it is not necessary at this time.

B. Find some pieces of paper that will be large enough and light enough to make kites. Ask students to draw pictures on one side of the paper showing energy products or human energy and how it is used. They can be as creative as they like about these pictures. They will serve as the basis for their kites.

Now find enough string and wood for the students to put together their kites. As they are making their kites, talk with them about how kites are energy products. The paper they have used for their picture is made of wood, as are the wood braces and string they are using to put together the kites. They are also using human energy in the process of making the kites. Students should see that kites are energy products because they are made from energy sources and human energy is used to make them.

You may want to have students recognize that non-human energy is also used to make energy products. If so, help them to make clay pots. First have them form clay, this uses human energy. To show them how non-human energy is involved in forming clay pots, use an electric skillet or toaster oven to dry and harden the pots (be sure to place a rack in the skillet before baking clay pots). The result will be hardened clay pots which are energy products.

Now return to the list of energy products students made in Activity A. Help students to add to their list of energy products that are made from wood and other energy products sources and those that are made using human and non-human energy. Their list could include products made from energy sources such as tables and pencils, or products made using energy sources such as toys and food.

C. Ask students to find pictures in magazines which show energy products and their use. As students are collecting their pictures, talk with them about what energy products they are collecting and how these products use energy. When they have completed collecting pictures, help them make a collage for class.

D. Ask students to act out one way that they use an energy product in order to help them every day. Have the class try to determine what the student is acting out and how it involves the use of energy products.

E. Ask students to talk with their parents about three energy products which help them to do things every day. Have students bring their ideas back to class and talk with them about how they use energy products at home as well as at school.

F. Help students to summarize what they have learned by talking with students about the difference between human energy and energy products. Talk with students about how human energy and energy products are reflected in their collages. Lead a class discussion using the following questions:

1. What human energy is being used in these pictures? (i.e. Arms are moving objects; legs are moving objects.)

2. What energy products are shown in these pictures? (i.e. crayons, books, toys)

3. Why are energy products important? (i.e. Without them we could not do things that we do every day.)

G. Have students draw a picture, paint a picture, or make pictures in their sandboxes which show different types of energy products. Talk with students individually or as a group about the pictures that they have drawn, pointing out what energy product is involved and how it is used. Then discuss with students how important it is to recognize energy products around them and to use them carefully.

Grade Level Adaptation

2-3: Have students take a hike around their school. Have them draw pictures of energy products that they see. Have them discuss their pictures in class.
4-6: Have the students break into groups and do surveys of one day in their lives and what energy products they use in that day. Have them do a report to the class.

Language Arts Adaptation

K-1: Ask students to do a scavenger hunt in their classroom, playground, or school. Have them describe the energy products which they find that are examples of non-human energy.

2-3: Have students develop a diorama of energy products in their class. Have them talk about their dioramas with the class.

4-6: Have students find or create poetry which stresses the value of energy products. Have them analyze and interpret the poems in terms of what energy products are used, how they are used, and how they need to be saved.

Math Adaptation

K-1: Ask students to go out on the playground and count the number of human and non-human energy sources that they find.

2-3: Have students take one day in their lives and count and compare the number of energy products they use.

4-6: Take a magazine that students all read that has advertisements in it. Have students break into groups and study the advertisements. Ask them to report on the kinds of energy products that are represented in the ads.

LESSON 2-2: ENERGY PRODUCTS IN YOUR CLASSROOM

Rationale

This lesson focuses on energy products in your classroom. It gives students an introduction to some basic knowledge about energy products and their use. Students then apply their knowledge to their classroom activities.

Lesson 2-2 promotes basic knowledge (students will learn more about energy products later). It is based on the idea that students need to have information in order to be effective energy actors. They also need to be able to apply that knowledge to a close-to-home reference point, the classroom in which they learn things every day. In later lessons, they will see how energy products are used in their whole school and home.

Objective

Students will be able to recognize energy products in their classroom. Teachers can assess student attainment of this objective through the game in Part E of this lesson, or through Assessment Activity 2 at the end of this chapter.

Main Activity

A. Discuss with students how their classroom is full of energy products. Give them an example of how they use lights to see or crayons to color. Ask them to be silent for one minute (two, if possible) and look around them for energy products. When you think they have had enough time, ask them to tell you what energy products they see and how they use them (i.e., pencils to write with.) Help them a little bit with ideas if they need them. Write the words "Classroom Energy Products" on the board or a big sheet of paper.

B. Now use pictures 2-1 through 2-3 to explore the idea of classroom energy products. Ask students what energy products they see in each picture. Ask them to look at their own walls, ceiling, desks, etc., to find more energy products as you move through the pictures.

Picture 2-1: Ceiling and Wall. The lights are energy products because they use electricity. We use them to help us see, walk and learn. Heaters are energy products we use to help us keep warm. The heaters use electrical energy.

Picture 2-2: Wall with Pictures. Chalk is an energy product because it is partly made from oil.

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Human and non-human energy are used to make it. Chalk helps us learn. We use paper for pictures that help us learn and make us happy. Paper is an energy product. It is made from wood. Human and non-human energy is used to make it.

Picture 2-3: Inside a Classroom. Crayons and paints are energy products. They are made in part from oil. We use crayons and paints for making pictures that help us learn and make us happy. Books are energy products. They are made from wood. We use books for reading and learning.

You can probably think of many more examples in your own class. Use it as a reference, and have students point out or pick up and show energy products.

C. Discuss with students how energy products are all around them in their classroom. Use the following questions to guide your discussion. Put the answers to Question 1 on the board under the words "classroom energy products."

1. What kinds of energy products do we use in our classroom? (i.e., Heaters are used for warmth, crayons are used to color.)

2. Why do we need classroom energy products? (i.e., We couldn't paint, color, use books.)

D. Have students color the classroom pictures in Activity B. Have them add energy products they use in their own classroom.

E. Tell students that they are now going to play a game. The object of the game is to find the most kinds of energy products they use in their classroom that they can actually pick up and use (i.e., pencils, crayons, paper). Students will work in teams of 3-5 players. They will collect all of the examples of energy products they can find in one pile for 10 minutes (or 5 or 15). The team with the most kinds of energy products wins. Discuss (and count) the energy products the students collect. Add more things to their list on the board. Be sure you list the product and its use. Declare one team a winner (others are not losers). (Have them put the objects back at the end of the discussion!)

F. Have students gather or draw pictures of classroom energy products and how they use them. Make a collage that you can put on the wall of all the things that are classroom energy products.

G. Discuss the importance of taking care of energy products (see Lesson 1-5). Have students talk about ways they can take care of classroom energy products (use crayons until they are completely used up). Have them practice taking care of one kind of energy product for a week. Discuss with them the importance of their actions as they carry out the activity.

Grade Level Adaptation

2-3: You may wish to collect your own pictures. Students can also make lists of energy products they use rather than collecting them.
4-6: Students can collect their own pictures as well as articles about energy products. They can work in groups to develop a class presentation about each energy product.

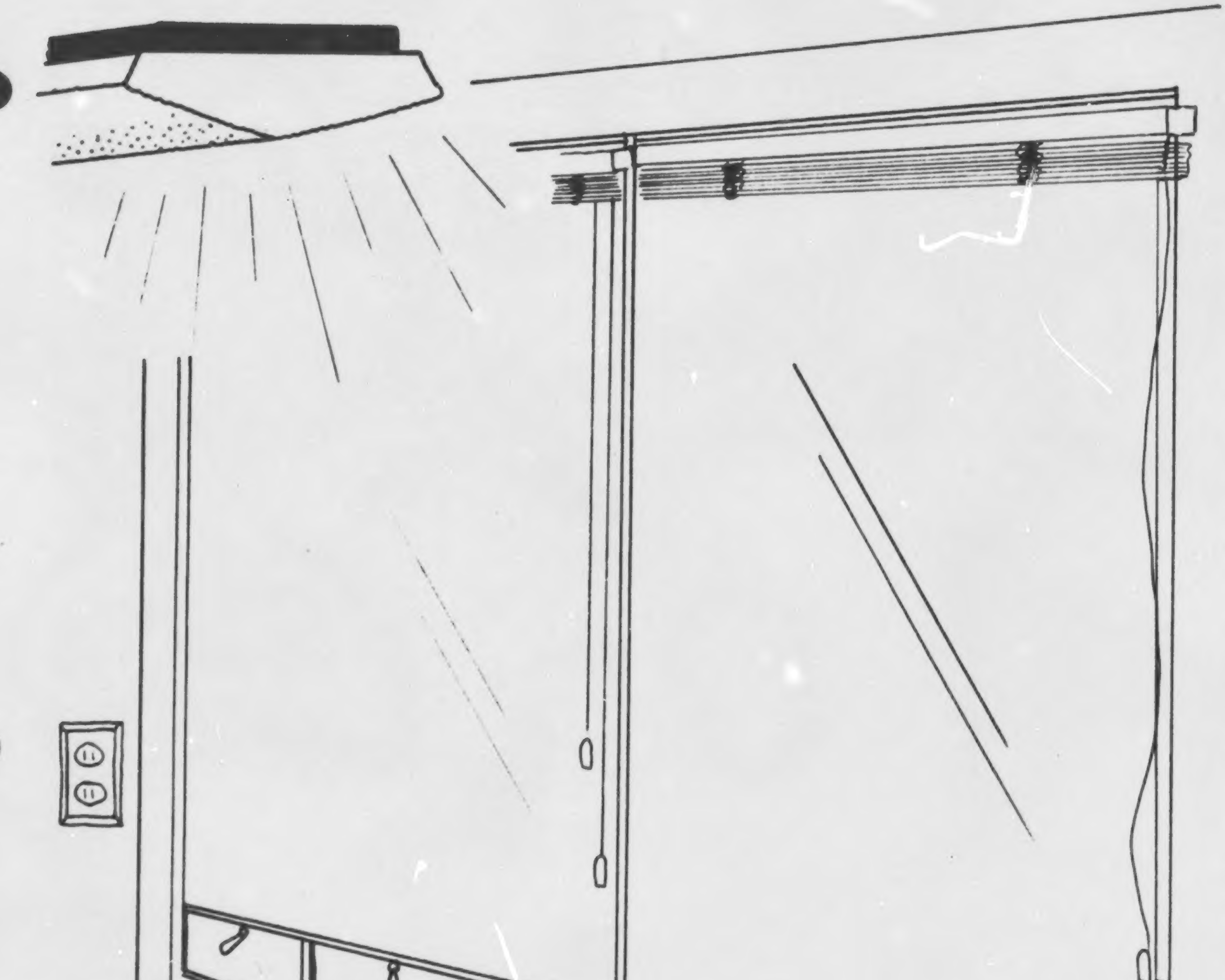
Language Arts Adaptation

K-1: Have students read the words for each energy product.
2-3: Have the students identify the words for each energy product. They can spell them, put them in one-sentence definitions, or write a short paragraph about the uses of these energy products.
4-6: You might want to play a kind of spelling bee game using energy products. One side might be given a turn and then asked for both the definition and an application in your classroom. Then the other side would have its turn. Winners would be the team with the last person giving a correct response and example.

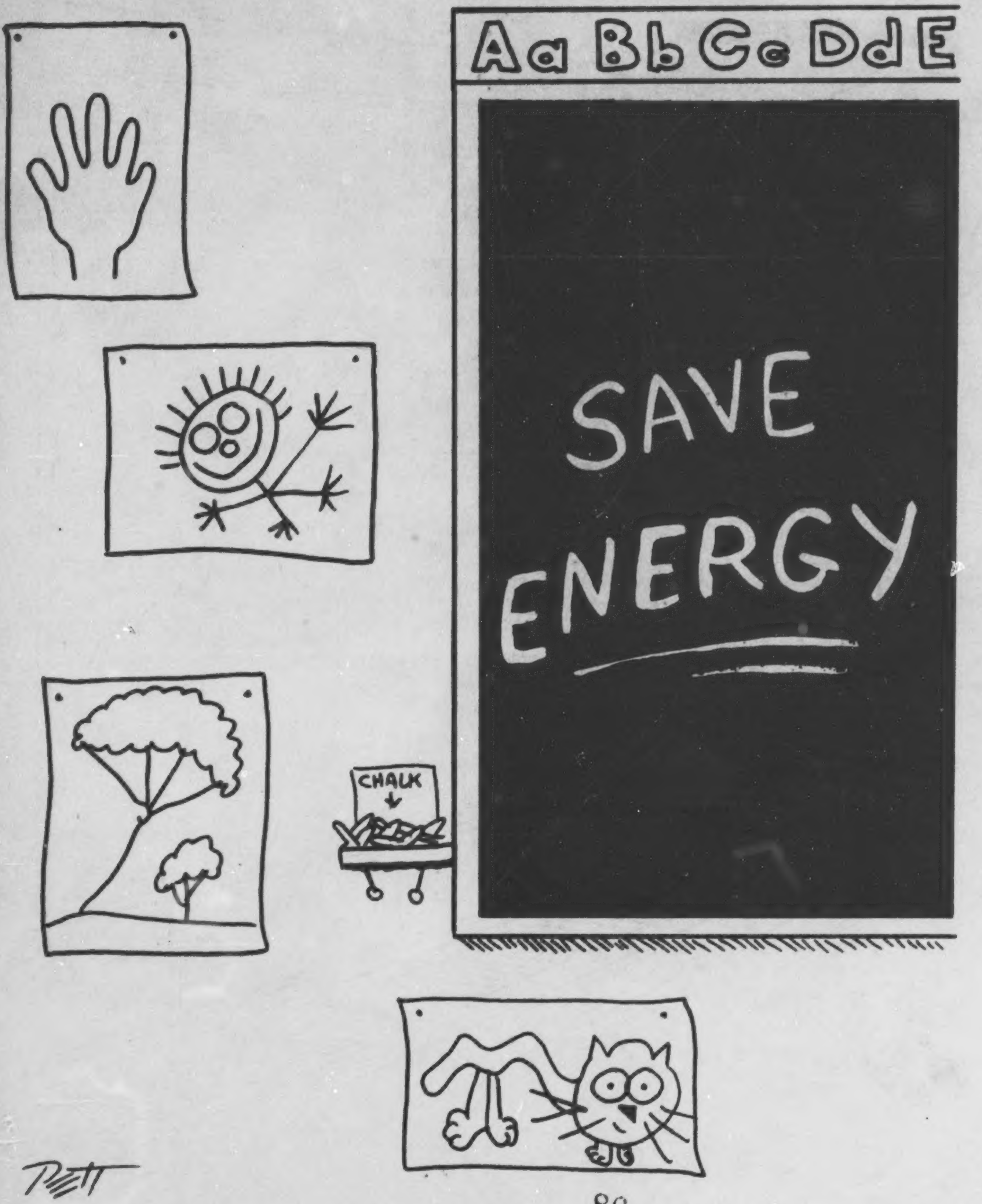
Math Adaptation

K-1: Students may wish to count the energy products in their class.
2-3: Have the students count the energy products on your list. You can practice addition and subtraction by removing or adding various energy products on the list.
4-6: Students might want to monitor their class (or school) thermostat in order to calculate similarities and differences in the usage of energy in their class and others.

LESSON 2-2: PICTURE 2-1



LESSON 2-2: PICTURE 2-2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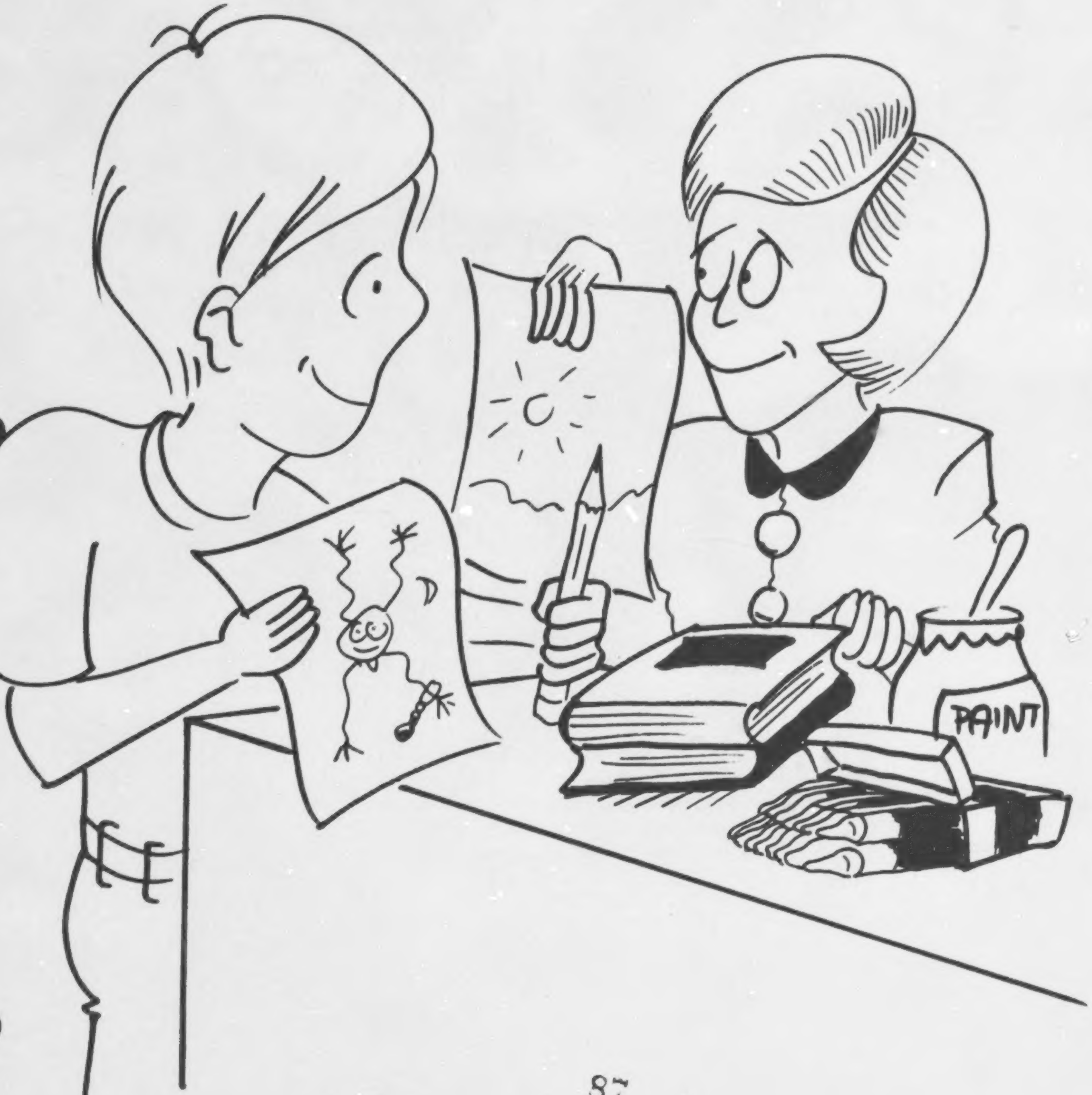
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LESSON 2-3: ENERGY PRODUCTS IN YOUR SCHOOL

Rationale

Students will expand their concept of energy products from their classroom into their entire school. Schools across the United States are very large energy consumers. It is important for students to know ways in which schools use energy and energy products.

Here our goal is to make students aware of how schools use energy. Students should get a very general idea of energy products that are used in school, and make some plans to take care of energy in their particular school.

Objective

Students will be aware of the use of energy products in the school environment. Teachers can assess this objective by evaluating students' pictures in Activity B of this lesson, by students' responses to Activity F, and by Assessment Activity 1 at the end of this chapter.

Main Activity

A. Talk with students about how, just as they use energy products in their classroom, they use energy products in their entire school. Their entire school uses much more energy than their class. Now talk with students about various parts of their school that they might look at in terms of energy products. Students might name the playground or the classroom, the drinking fountain or the washroom. Be sure that students think about all of the different kinds of places energy products are used. If they do not think of some places, mention to them, for example, the principal's office or the cafeteria. Students should walk away from this discussion thinking that there are many various places in their school that use energy products every day.

B. Have students draw a picture of their favorite spot in the school. Ask them to illustrate energy products and how they are being used in that spot. As students are drawing their pictures, talk with them about the energy products and how they are used in their favorite spot in the school. Have several students present their pictures before the class and talk about energy products that are used in their favorite spot.

C. Plan a hike through the school with the students. Have the students name all of their favorite spots in the school. Have them plan a route through the school that the class might take in order to see where energy products are used. When students have planned their routes, check with personnel that are in places where students will visit. Ask them to talk with the students very briefly about how energy products are used in that particular place. When students have returned from their hike, talk with them about all of the energy products that they saw being used in their school setting, utilizing the following questions to focus the discussion.

1. What products use energy to make them work? (e.g. clocks, phones, tape recorders)
2. What products are made using human or non-human energy? (e.g. desks, chairs, food, dishes)
3. Why are these products important? (e.g. Without them our school would not function.

D. Bring people from your school into the class and have them talk about ways that they use energy products in playing their part in your school. Then have students act out the roles of these people and show ways that they use energy products. Have the class discuss the actions of each student or group of students in terms of how energy products are being used in their school.

E. Then talk with students about how many of the energy products that are used in their school are the same as those their class uses. Have students make a comparison between the energy products they found in their class and the energy products used in their school. Guide the discussion with the following questions.

1. What energy products are used in our class? (e.g. pens, heaters, lights)
2. What energy products are used in our school? (e.g. heaters, lights, telephones)
3. What energy products are the same in our class as in our school? (e.g. heaters, lights, pencils)
4. What energy products are different in our class than in our school? (e.g. Phones are used in the school, crayons are used in their classroom.)

F. Ask students to select one energy product that uses energy in your school. Ask them to make some determination of how much energy is used. You might gather these figures for them. If you choose heaters or lights, for example, you can get this information from the school administration.

Talk with students about how the school uses much more of this energy than their individual class. Because of the amount of energy that is used, ask them how they think they might take care of this particular type of energy. Have them talk about plans that they could make for saving energy in their school. If you want them to act on this plan, go ahead. Be sure that the relevant school officials are informed and involved. The idea here is for students to see that they can help to save energy in their school as a whole and that saving energy is important.

Grade Level Adaptation

2-3: Ask students to plan a hike through their school to see the sections that use energy products. Then have them talk with people in their school regarding how energy products are used. Have them share their information with the class and then have the class make a plan about how to save energy.

4-6: Have students do a formal survey of their school and the energy products that are used. Schedule a debate over various methods for saving energy. Then have students plan ways that they can save energy in their school. Have them carry out some of these plans.

Language Arts Adaptation

K-1: Ask students to interview one person in their school using a tape recorder. Have them ask that person two or three questions which the class has composed, and then play the tapes for the entire class to hear. Have students talk about how people use energy products every day in their school.

2-3: Have students draw a picture and write a paragraph regarding how energy products are used in that picture.

4-6: Have students develop a play about energy products in their school and how energy can be saved. Everyone in the class can take part, or the students can develop plays in groups.

Math Adaptation

K-1: Help students to count the number of lights in the classroom to see how much of this energy product they use.

2-3: Have students count the number of lights in the school cafeteria. Then use the math function that you are teaching to describe which of the two places uses the most energy in their school.

4-6: Have students divide up into groups and select one form of energy that is used in their school. Have them develop a way for determining exactly how much energy is used, and have them present their findings to the class.

LESSON 2-4: ENERGY PRODUCTS IN YOUR HOME

PART I

Rationale

In previous lessons, students have learned about energy products in their classroom and their school. Here they will begin to learn about energy and energy products in their homes, beginning with whatever room of the house they use for sleep. Some students will have their own room; others will share a room with other children/adults. Still others may sleep in a living room. The lesson can be used flexibly; its aim is to extend students' awareness and knowledge.

Students will also learn a basic skill in this lesson. Students need both inquiry and participation skills in order to put their knowledge to use. Here we will present one of the most fundamental inquiry skills, how to ask questions. Unless students can ask questions, they will not be able to use their knowledge to find out about more important topics such as energy. Here they will ask questions about how they use energy products at home in the room they use for sleeping.

Objectives

1. Students will extend their awareness of energy products through a study of their homes. This objective can be assessed by evaluating students' pictures in Part B of this lesson.

2. Students will develop skills in asking questions related to the energy problem. This objective can be assessed by carefully reviewing students' questions in Part C of this lesson or by using Assessment Activity 2-4 at the end of this chapter.

Main Activity

A. Discuss with students the idea that, just as energy products are found at their school, they are also found in their homes. Ask them to tell you what room in their home they use the most for sleeping, dressing, playing. Then say that in Ron's home he uses the bedroom he shares with his two brothers the most. Show Picture 4-1 of Ron's room. Ask students what kinds of energy products they see in the picture and how they use them (i.e., lights to see with, toys to play with). Talk with them about how many of the same energy products are used that they found in school.

B. Ask students to draw a picture of the room they use the most in their home for sleeping. They can take the pictures home and have their family help them. Ask them to think about (and include in their drawing) some energy products they use every day.

C. Discuss the students' pictures in class, using the following questions to reinforce students' knowledge about energy products in their homes:

1. What energy products can you find in your home? (i.e., heat, lights)

2. What energy products do you use every day? (i.e., most of what they mention in #1)

3. Why are home energy products important? (i.e., We use them for play, dressing, sleeping.)

D. Discuss with students that, in order to learn more about energy products they use in their homes, they need to be able to ask questions. Suppose that they wanted to find out more about Ron's room or about energy products in one of their classmate's homes. What questions would they ask?

If they do not know what a question is, explain that it is asking someone else for an answer like: "Do you like to play ball?" "Can you play this afternoon?"

Work with the students to put a series of questions on the board. Three to five questions will be fine. The students' questions should not be criticized at this point. The class should just discuss what possible questions they think would be most important to ask one of their classmates about energy products they use in a room at home.

E. You should now teach students about important question-asking skills. You can use the questions that have been put on the board as examples. Have them try to determine which questions are the best questions in terms of getting important information about energy products in their classmates' home.

There are two important parts of good question asking. The first is that a question should be clear. You should be able to show students how some of their questions are clearer than others, more direct, more to the point, more precise. These questions are better to ask than more vague questions, because they help to get better information.

A second part is that a question should be related to the problem that students are trying to study or the information they need. For example, if a student asks about the number of people in a family, this question is not necessarily directly related to the use of home energy products. If the students ask questions about the use of energy products in their bedrooms, then they are asking directly related questions.

Students should then develop two or three more questions which they think will meet the idea of good questions about energy products in their classmate's home.

F. Now break students into pairs. Tell them they want to find out as much as they can about energy products and how their classmate uses in his/her room. Have them ask questions to find out. They should then draw a picture of their classmate's room and the energy that is used, based on the answers they get. They can ask more questions as they draw.

G. When students have finished their pictures, conduct a class discussion using the following questions as guides. Put the words "Home Energy Products" on the board. List students' responses to question #1 under the words.

1. What kinds of home energy products did you draw? (i.e., lights, heaters, tables)
2. What questions helped you to get the most information for your picture? (i.e., those that were clear, related)
3. Why do you think asking questions is important to find out about energy products? (i.e., You can get more information, you can get new ideas.)

H. Now ask students to think about the energy products they use in their rooms at home and the energy products their classmates use. Ask them to bring one energy product which they use a lot (every day) from home to class. Have them talk with their family about the choice. In class the next day, have the students show their products to the class. Have them explain how and why they use the product a lot. Have the class ask questions (clear, relevant ones) about the student's use of the energy product.

I. Then remind students that it is important to take care of energy products. Ask them how they might take care of the energy product they brought to class. Ask them to try to take care of it for one week. During the week, talk with students about how they are doing. Help them to see how taking care of energy products is important.

Grade Level Adaptation

2-3: Use pictures of home energy products from books and magazines. You might want students to draw up more questions and actually write out a survey as individuals or groups.

4-6: Use pictures of home energy products from magazines or newspapers. You could extend the survey to the entire household. Students could do a survey form.

Language Arts Adaptation

K-1: Have students act out their uses of the home energy product they bring to class.

2-3: Ask students to make sentence answers to the questions they developed in this activity.

4-6: Have students work in groups to draw up a written plan for energy conservation in their homes.

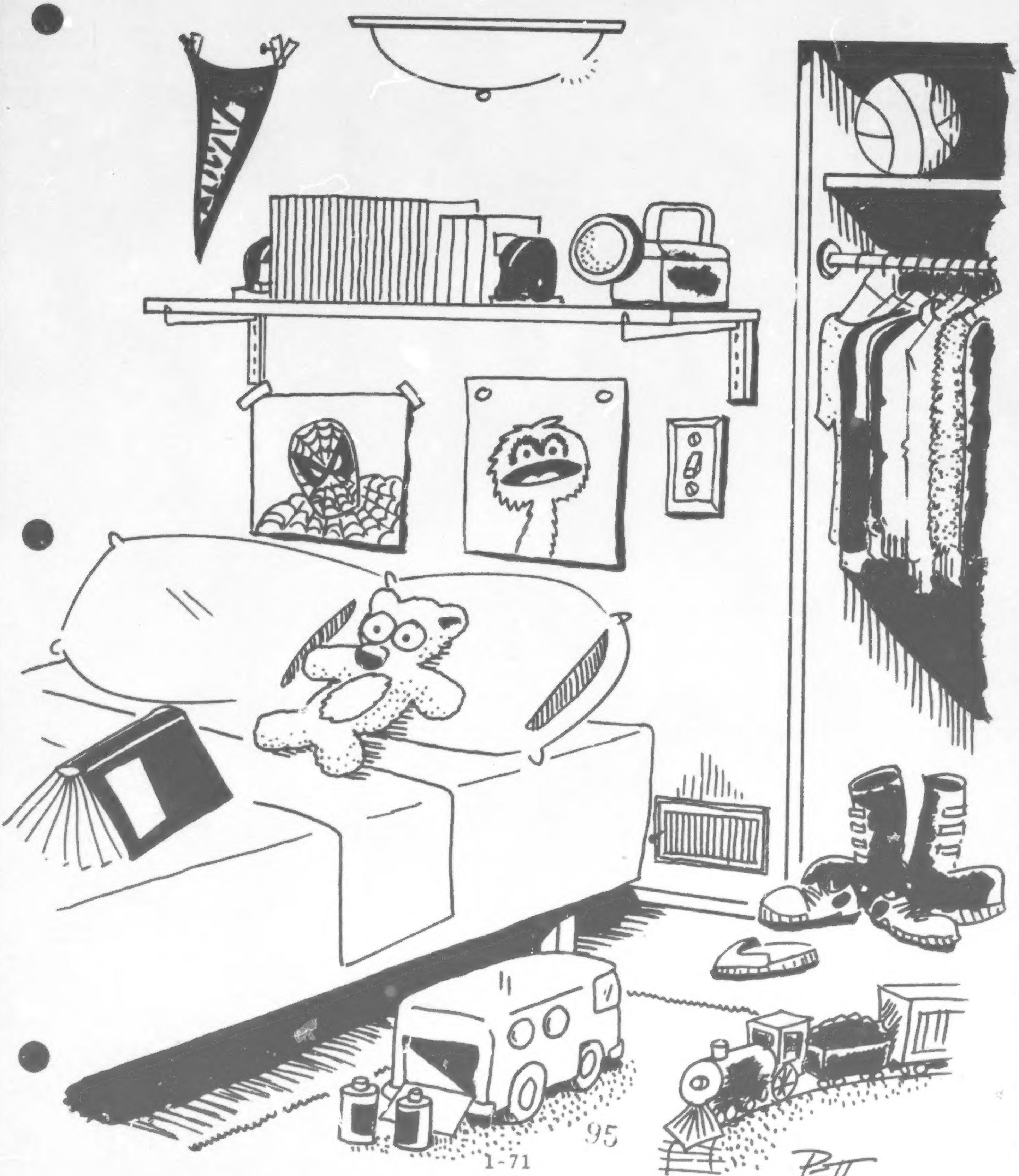
Math Adaptation

K-1: Have students count the number of light bulbs in their sleeping rooms. Have them determine the least number of bulbs they need to turn on in their rooms for reading, dressing, sleeping, and playing.

2-3: Have students add the total wattage of all of the light bulbs in their sleeping room. Have students find the lowest number of watts they need to use in their room for reading, dressing, sleeping and playing.

4-6: Ask students to add the total wattage of light bulbs in all the students' sleeping rooms. Then divide by the number of students to determine the average amount of wattage per room.

LESSON 2-4: PICTURE 4-1



LESSON 2-5: ENERGY PRODUCTS IN YOUR HOME

PART II

Rationale

Students will now move from studying one room in their home to their entire home. Homes are one of the chief users of energy products across the nation. People use a great deal of energy heating their homes. They also use a lot of energy in driving their cars.

Here we will make students aware of the many uses of energy products in their homes. This awareness will lay a base for helping students to promote conservation of energy in their everyday lives at home.

Objective

Students will be aware of the uses of energy products in their homes. Teachers can assess student attainment of this objective by studying the students' pictures and plans for saving energy in their homes in Activity E of this lesson, and by using Assessment Activity 2 at the end of this chapter.

Main Activity

A. Talk with students about the kinds of homes that they live in. Some people live in houses; others, apartments. Some live on farms; other live in cities. Some homes have a lot of people in them--sometimes many families. Others have just a few people. Students should see that there is a wide range of places where people live. All of these places are "home" to some people. Tell them that the places in which they live are major energy consumers. In all of them, people interact on a regular basis in sharing, eating, sleeping, and showing love and affection.

B. Talk with students about how every room in their home uses energy. There are common things in most homes that are major users of energy. Use the following pictures to discuss with students the many uses of energy products in their homes. They should know what the energy products are and identify how they are used. They should relate these pictures to their own homes.

Picture 5-1: Kitchen. Ovens are energy products that use electricity. Dishwashers and refrigerators are also energy products. They also use electricity.

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Picture 5-2: Living Room. Living rooms also use energy. People use energy sometimes in watching television. TV's are big energy users. Have students expand on these ideas using examples from their own homes.

Picture 5-3: Garage. Sometimes people have tools in the garage that use energy because they must be plugged in and use electricity. Some people have garage door openers. Some people also have cars. Cars use gasoline, and they use a lot of energy. Relate these ideas to students' homes.

Picture 5-4: Outside the House. People use a lot of energy outside of their homes. They have electric lawnmowers or farm equipment. They use electric grills or other types of equipment in order to keep up their home or to enjoy that portion of their home which is outdoors. Some homes have lights outside for security. Relate these ideas to students' homes.

C. Ask students to color the pictures; add those products which use energy in their homes. You might also want them to make a collage of their pictures or of pictures they can collect. They can then act out different ways that people use energy products in their homes and can have other students talk to them about what their action is, what energy product is being used, and how people use energy in most of their homes.

D. Then ask students to go home and to take a look at how many different ways they use energy in their homes. Have them talk with their parents and/or brothers or sisters about how energy products are used. Have them bring their ideas back to class and add to their list of products that use energy in their homes.

E. Help students to choose one product that they think uses a lot of energy in their homes. Have them draw a picture of that product being used. Then talk with the students about their pictures and about how they might save on this energy. They might use it less, or less often. They might decide to use something else rather than this particular product. Tell them that they should plan to save energy with the product they have chosen.

F. Ask students to go home and talk with their parents and brothers and sisters about saving that energy product. Have them ask their families to develop a plan for how they might save more energy. Make sure all family members agree that it is a good thing to do, and that they will try to do it from now on.

G. Discuss students' plans with them and what they are going to do about saving energy. Talk with them about how saving energy is important, using the following questions:

   1. What energy products do you need to save? (e.g., lights, appliances, paper)

   2. How is this product used now? (i.e., We use it every day. We use it in every room in the house.)

   3. How might we save the energy this product uses? (i.e., use it less, use it less often)

   4. Why is saving energy important? (i.e., Homes use a lot of energy; saving contributes more energy for everyone.)

Grade Level Adaptation

2-3: Ask students to bring in different pictures of homes and show how some homes use more energy products than others.
4-6: Help students to survey their homes. Have them develop a form so that they can get comparable data for all of their homes. Then have them tabulate the data and make a plan to save energy. Ask them to keep logs of their energy conservation.

Language Arts Adaptation

K-1: Ask students to use puppets to act out how people use energy products and can save energy in their homes.
2-3: Have students collect pictures of places in the home that use energy products. Have them compare one place with another and how much energy is used in each. They might write out their comparisons of how the same energy is used or is used differently in sentences.
4-6: Ask students to construct a dialogue in which someone is trying to convince someone else of the benefits of saving energy in their homes.

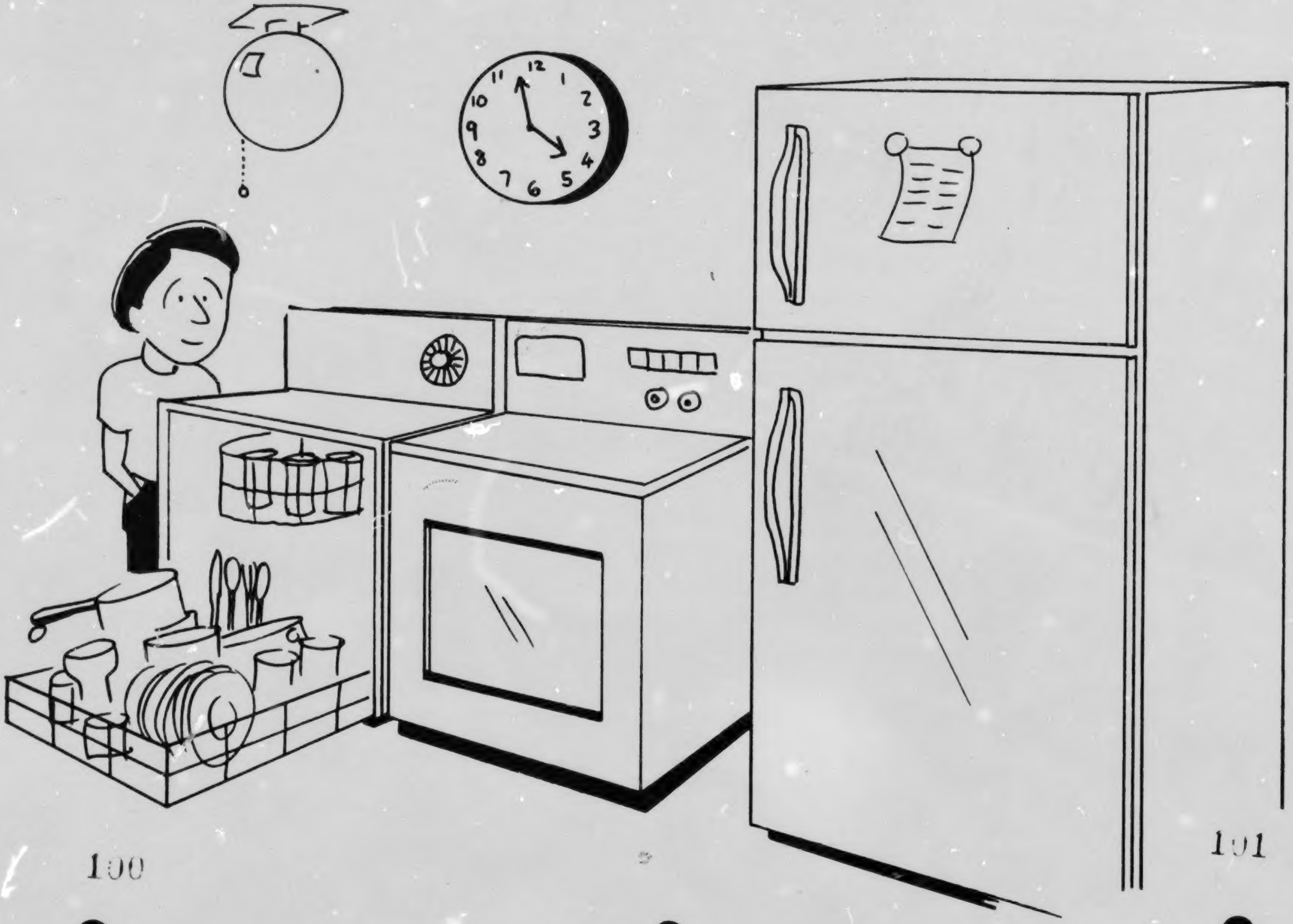
Math Adaptation

K-1: Have students count the number of light bulbs used in their homes, the number that are used frequently, the number that are used only once a day, and the number that are on almost all of the time.

2-3: Have students add the wattage of all of the electrical appliances in their homes. This information can usually be found on the back or the bottom of the appliance.

4-6: Have students add the total wattage of energy products using the electricity measure of watts. This can usually be found on the back or the bottom of electrical appliances. Then have them divide the total figure by the number of students in the class to find the average amount of watts of electricity used by appliances in the homes of the members of the class.

LESSON 2-5: PICTURE 5-1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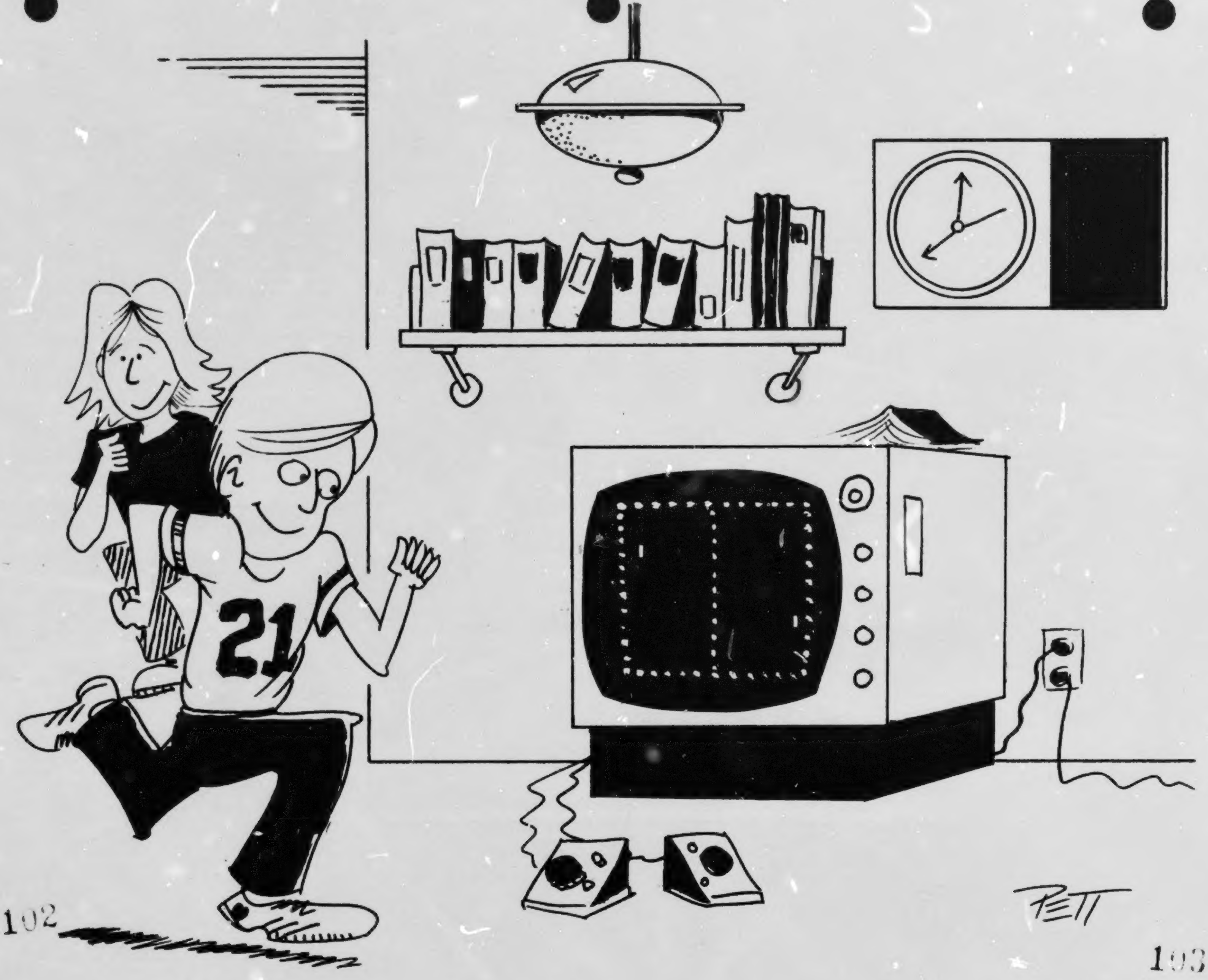

LESSON 2-5: PICTURE 5-2

LESSON 2-5: PICTURE 5-3

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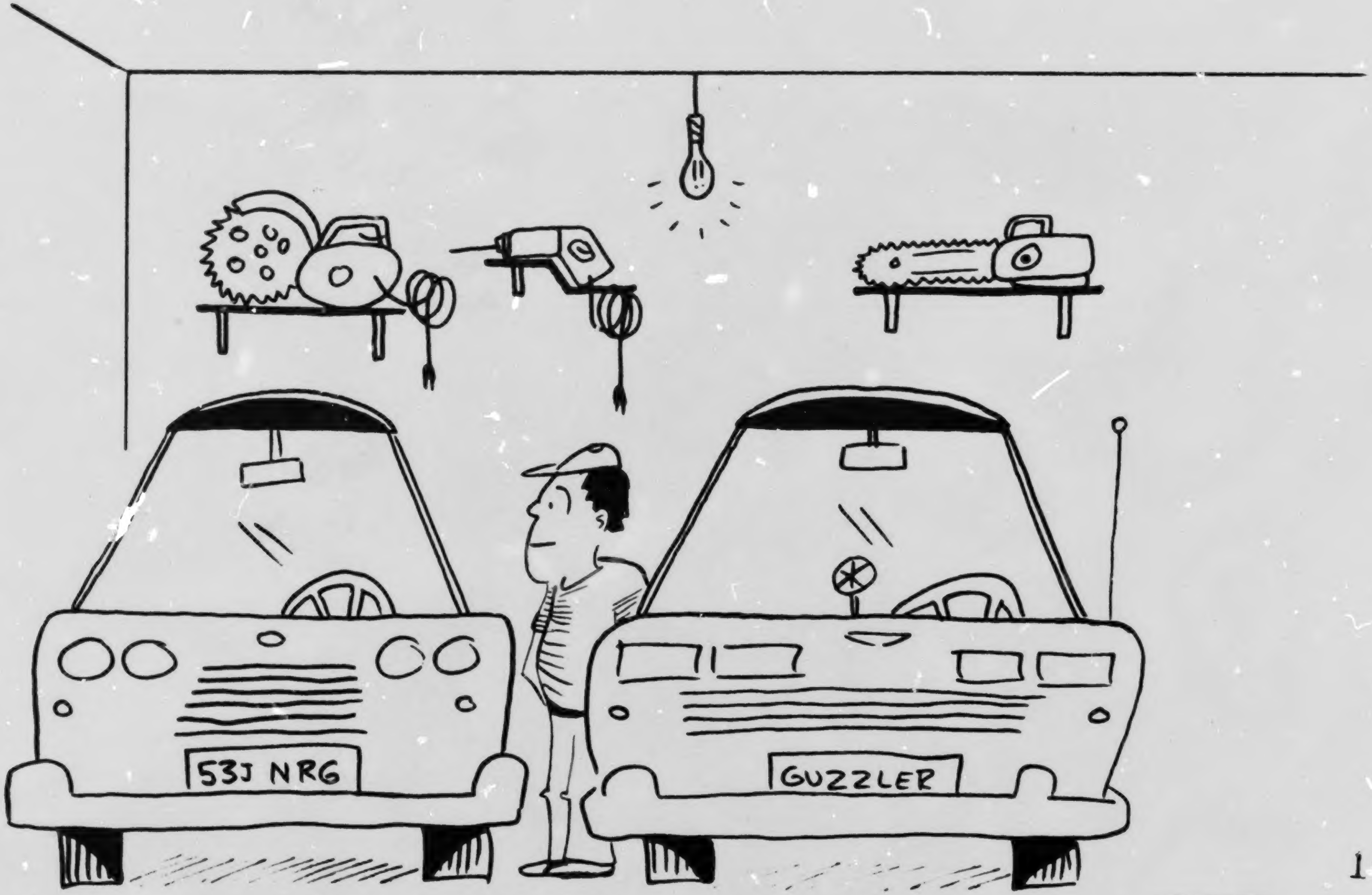
53J NRG
GUZZLER

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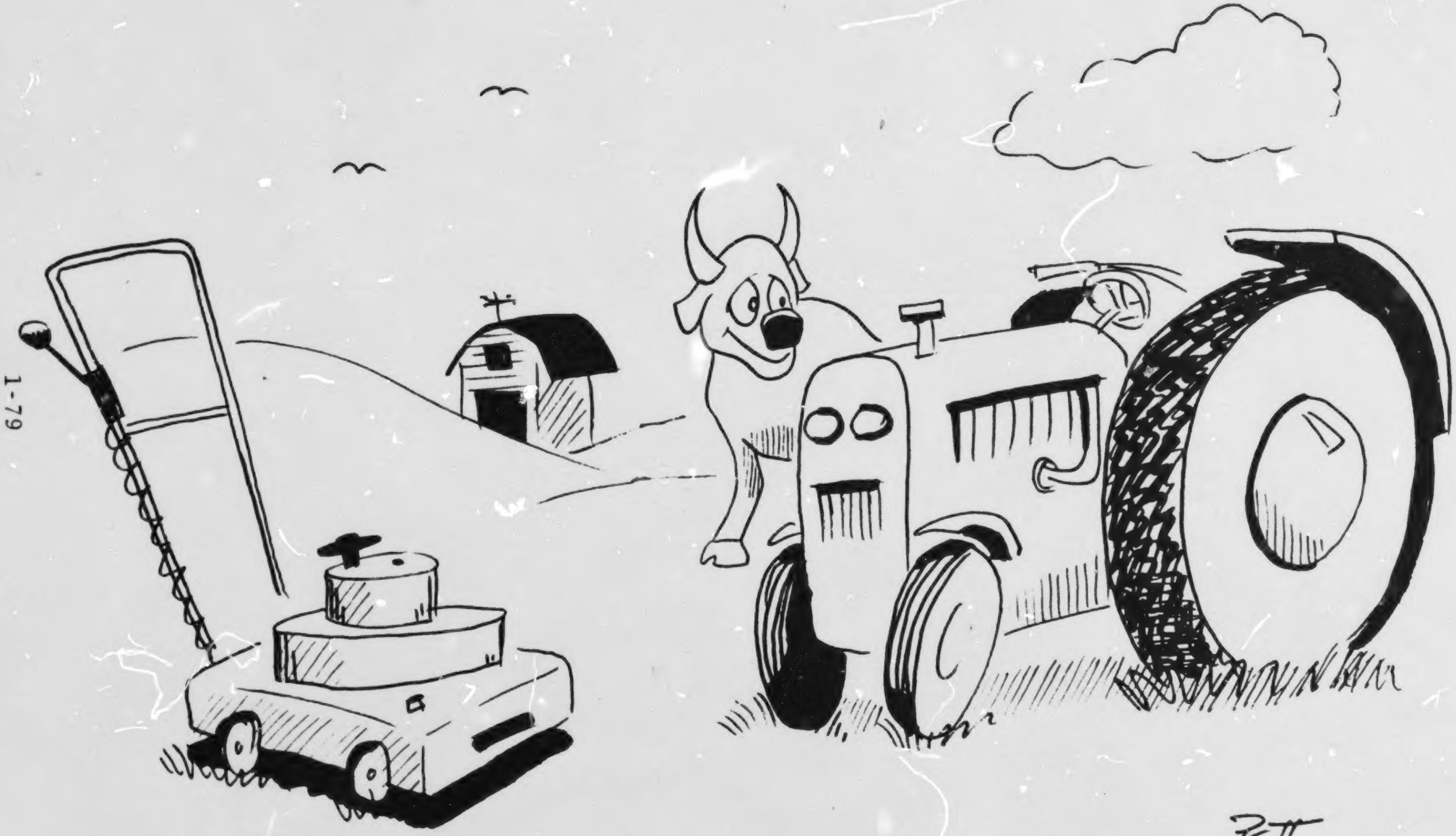

LESSON 2-5: PICTURE 5-4

LESSON 2-6: TAKING CARE OF ENERGY

Rationale

Students have studied energy in their homes and school. They should now have awareness of different energy products and how they are used in these places. They will be asked to take care of energy based upon what they know about their own use of energy products.

This lesson promotes awareness and some experiences in taking action. These kinds of experiences are important to training effective energy actors. In later lessons, students will learn specific skills in how to take action on energy problems. Here, they will become aware of how they can take action and, hopefully, achieve some success at a small, well-defined task.

Objectives

Students will be aware of actions they can take regarding energy problems and will apply their awareness to actions in their homes and at school. Teachers can assess the achievement of this objective by student reports on their activities in their families and their school in Activities D and G of this lesson.

Main Activity

A. Review with students the energy products they have discussed in their homes and their school. Then ask them what major problems they see in energy use in their homes and school. Have students speculate about what they think the most important problems are and what problems they think they can do something about.

B. Then have students select one problem with using energy products in their homes. Have them draw pictures about this problem. As they are drawing their pictures, talk with students about why they think that problem is important and what they think that they can do about it.

C. Help students to develop plans for solving their problems at home. Those plans should involve what they think they can do to help solve the problem, how they will approach their families about their problem, and how they will try to save energy.

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D. Then ask students to talk with their families about their problem and to see if they will help them in solving it. Based on what their families say, have students try to carry out a family plan for saving energy based on the problem that they have identified. When students have completed their task, discuss their problem solving with them using the following questions:

1. What problem did you try to solve? (e.g., to turn off more lights)

2. What did you try to do about that problem? (e.g., I talked with my family. We then posted signs on our lights.)

3. Why do you think that solving this problem is important? (e.g., Saving energy saves money and helps everyone.)

E. Now have students think about one problem regarding energy in their classroom or their school. Have them identify a wide range of problems that they think are important and ones they think they can do something about.

F. Depending upon what problem they choose, help students to identify what to do about the problem. They might decide to put up signs or to talk with other people or to take initiative upon their own. Whatever the case, have them develop a plan for what they will do.

If appropriate, invite relevant people in the school to talk with the class about their plans for solving their energy problems.

G. Then have the class participate in various facets of the plan for saving energy in their class or school. Some students may make signs, some students may talk with relevant authorities, other students may monitor the use of lights or heat. When students have completed their tasks, lead the following discussion about their actions.

1. What problem did we try to solve? (e.g., turning off classroom lights)

2. What did we do about that problem? (e.g., We used the lights only half of the day; we closed our windows to prevent heat loss.)

3. Why is saving energy important in our school? (e.g., It saves money and energy for everyone.)

Grade Level Adaptation

2-3: Invite people into your classroom to respond to students' ideas about their plans for saving energy in their homes and school.

4-6: You may want to work in groups and devise written plans for how students would save energy in their homes and school. You may also want them to do written reports on the results which are shared with the class.

Language Arts Adaptation

K-1: Ask students to use puppets to practice how they will approach their family or classmates in carrying out their energy plans.

2-3: Have students role-play convincing someone of their energy-saving ideas.

4-6: Ask students to write a dialogue between two people in which one person is trying to convince the other of the benefits of saving energy in their homes or school.

Math Adaptation

K-1: Help students to devise a system of awards for saving energy. They might divide the awards into three categories of those who save the most energy, those who save some energy, and those who save a little bit of energy. Students can practice sorting techniques using this method.

2-3: Ask students to compute the number of minutes or hours they used in completing their plan in their home or school mathematically. They can do it on an individual-by-individual basis.

4-6: Have the class determine the percentage of time in a week it took to complete their plan. Have the class tally the results, and come up with a conclusion as to how much time had been involved.

ASSESSMENT ACTIVITIES FOR CHAPTER TWO

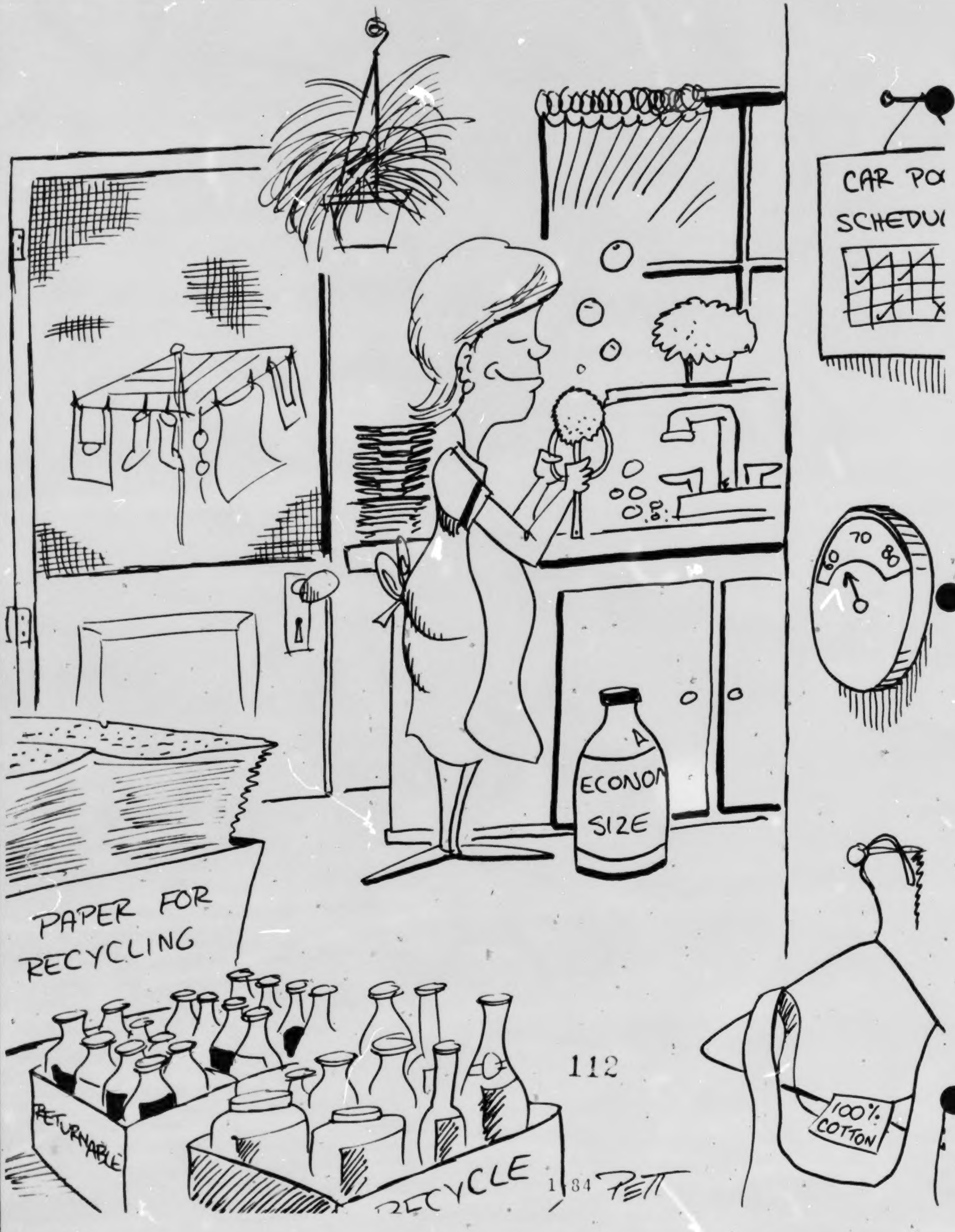
These assessment activities are designed to be used in conjunction with Chapter 2. They focus on energy use in the students' homes and school. Teachers will be able to assess whether students can recognize energy products in their homes and school, and whether they know ways that they can take care of this energy.

Assessment Activity One

This assessment activity focuses on the home. Students should be able to pick out energy products that are found in this picture and ways in which family members are trying to save energy. There are at least ten different ways in which energy can be saved that are depicted in this picture.

Assessment Activity Two

In this assessment activity, students sort energy products. They should be able to determine which energy products are in their homes and which are in their school. Some energy products, of course, are used in both their homes and school. In this way, teachers ought to be able to assess whether or not students can recognize basic energy products that are used in their environment.


CAR PO
SCHEDU
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ECONOM
SIZE
PAPER FOR RECYCLING
RETURNABLE
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100% COTTON
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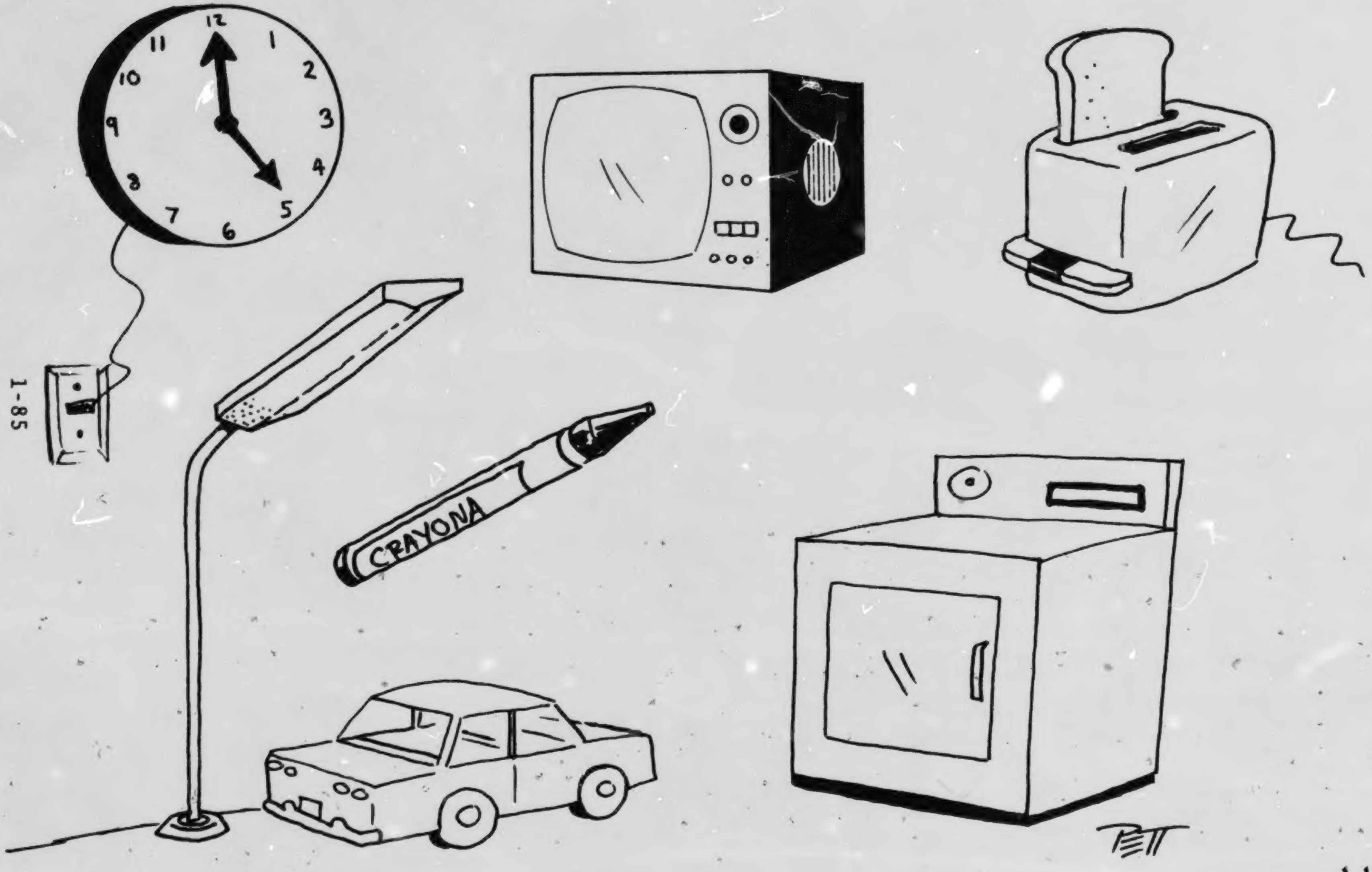
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CRAYONA

CHAPTER THREE: THE ENERGY PROBLEM AND YOU

Rationale

The major purpose here is to make students aware of the energy problem. The approach is that the problem is basically one of people's habits. Everyone is an energy consumer. How people shop for energy, how they use it, and how they dispose of it are key aspects of their consumer role. Students will learn about their consumer role and take action in trying to take care of energy. They will also learn about some fundamental skills in decision making that are necessary for them to take effective energy action.

Here our chief focus is awareness. However, we are interested in developing students' knowledge of their consumer role and of the decisions that are necessary for them to make. We will also try to develop skills in acting in consumer roles through lessons on the roles themselves and through a fundamental lesson in decision making. Finally, students will take action using their skills in a small, well-defined project in energy conservation.

Objectives

1. Students will be aware that they are energy consumers in their everyday lives (Lesson One).
2. Students will be aware of how they are energy shoppers on an everyday basis (Lesson Two).
3. Students will be aware of themselves as energy users (Lesson Three).
4. Students will be aware of their role as energy disposers (Lesson Four).
5. Students will recognize how individuals can help in the energy problem (Lesson Five).
6. Students will know basic decision-making skills (Lesson Five).
7. Students will rate their consumer role as a high priority in their everyday lives (Lesson Six).
8. Students will practice skills in taking their consumer role in decision making (Lesson Six).

LESSON 3-1: YOU ARE AN ENERGY CONSUMER

Rationale

One way of understanding the energy problem is to look at people and how they contribute to it. Changing people's habits is a key objective of these materials. Without changing their habits, we never will help to solve the energy problem.

This chapter attempts to make students aware of the energy problem in terms of their own roles as energy consumers. This first lesson attempts to make students aware that they are consumers of energy on an everyday basis. From this base, students will learn about various consumer roles and how to make decisions regarding energy conservation.

Objective

Students will be aware that they are energy consumers in their everyday lives. Teachers can assess the attainment of this objective by students' responses to the discussion questions in Part F of the Main Activity.

Main Activity

A. If students have a reason to have a party, go ahead and have it as a base for this lesson. Otherwise, you might bring in enough apples for the class in order to start this lesson. Students should merely consume some food in the classroom. As they eat the food, you should lead a discussion. Ask them what they are doing. They will probably say that they are eating apples, or other food. Ask them what happens to the apple. The idea is that the apple is gone and is "consumed." It is something that cannot come back. Then talk with students about how a great many things that they eat are gone forever. They have used these things as energy for their bodies, but they cannot be replaced. Everyone eats a certain amount of food every day. It is important to good health and to a happy life.

B. Talk with students about how eating the apples or the food during a party is an act of consumption. They are consuming something by eating it. People also consume things by using them to work, or play, or by throwing them away. People are consumers every day. Use the picture story about Suzie (1-1 to 1-4) which is attached with this lesson to illustrate for students ways in which people con-

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sume things every day. Ask students to pick out examples from the story of how Suzie acted as a consumer. Suzie is eating her lunch. Suzie is using her energy coloring and running. Suzie is tired because she has been consuming her energy all day. Suzie also uses energy products. Trucks which burn gasoline bring her toys and clothes and various energy products she uses every day. The store in which she buys energy products use lots of lights.

C. When students have studied the story of Suzie, they should compare what they do every day to what Suzie has done. They might want to color the pictures in the story or act out various ways in which they consume things on an everyday basis.

D. Students should then talk with their parents about how their families consume things. They should bring one thing to class (with parental approval) which is an object which they consume regularly. You should then discuss with them the variety of things that people bring to class and how consumption is part of their everyday lives.

E. Have students look through magazines or newspapers and cut out ads and pictures that feature people consuming things. Have them make a class collage about things that people consume.

F. Talk with them about their collage and indicate that consumption is part of their everyday lives. People consume a lot of things. Basically, they are also energy consumers. Have students look at the collage and pick out the items that people are consuming that are energy products, such as things that they have studied involving human energy or energy products in their homes and in their communities. Discuss the collage with the class using the following questions:

   1. What are people consuming in our collage? (e.g. food, tools, sports equipment)

   2. Which of the pictures represent the consumption of human energy? (e.g. people running, playing, working)

   3. Which of the pictures show people consuming energy products? (i.e. people using electrical appliances, people using lights)

   4. Why is it important to save these things? (e.g. because they are expensive, because we may run out of them)

G. Talk with students about how it is important to save energy products such as the ones in their collage. Ask them to indicate one thing that they think they could consume less often. Have them try to save that energy product for at least a week. Talk with them as they are trying to save it about their progress.

Grade Level Adaptation

2-3: Have students look at stories they are reading and indicate things which are being consumed by the people in the stories. Then relate these consumption patterns with the energy problem and have students do a collage of their own on energy products they use every day.

4-6: Help students to find reports on consumption patterns by people in the United States. Have them work in groups to study those reports and to develop a class presentation on energy products that are consumed. Bring in a speaker to the class who can talk about the consumption of energy products, and have students discuss energy consumption with that person.

Language Arts Adaptation

K-1: Bring in one person who can talk with students about consumption patterns. Help students to ask that person good questions.

2-3: Have students fill the class with products that they consume at school and at home every day. Work with students in a discussion explaining how those products are consumed and how energy is being used. Then ask students to make a diorama of the consumption of energy products either at home or at school.

4-6: Ask the class to do a consumer report on energy products that reflecting how energy is being used more and more every day.

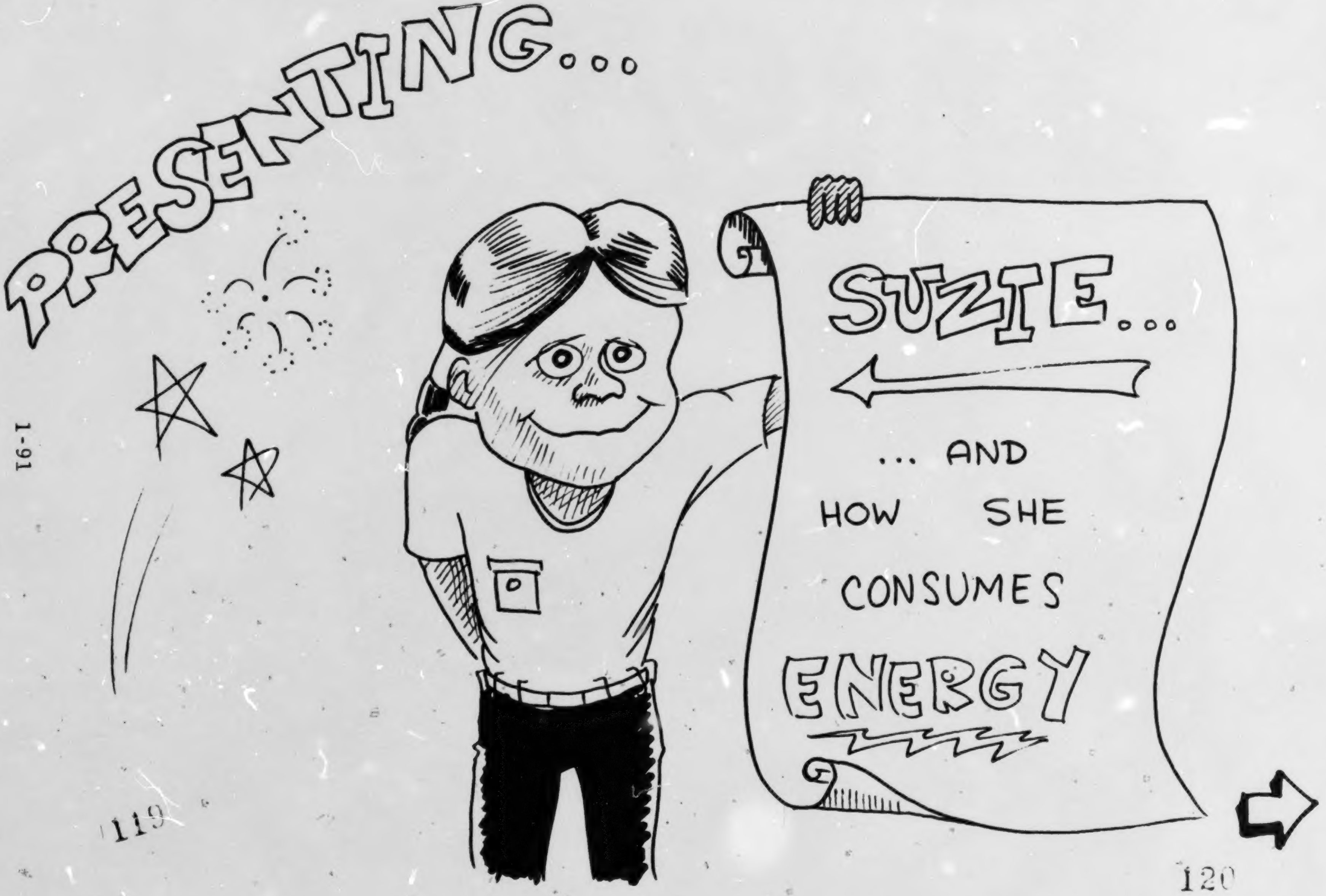
Math Adaptation

K-1: Have students count the number of bottles and the number of cans of pop they drink in a week. Help the students find the class total.

2-3: Have students study television ads during programs that they watch and determine how many energy products are advertised for them to consume.

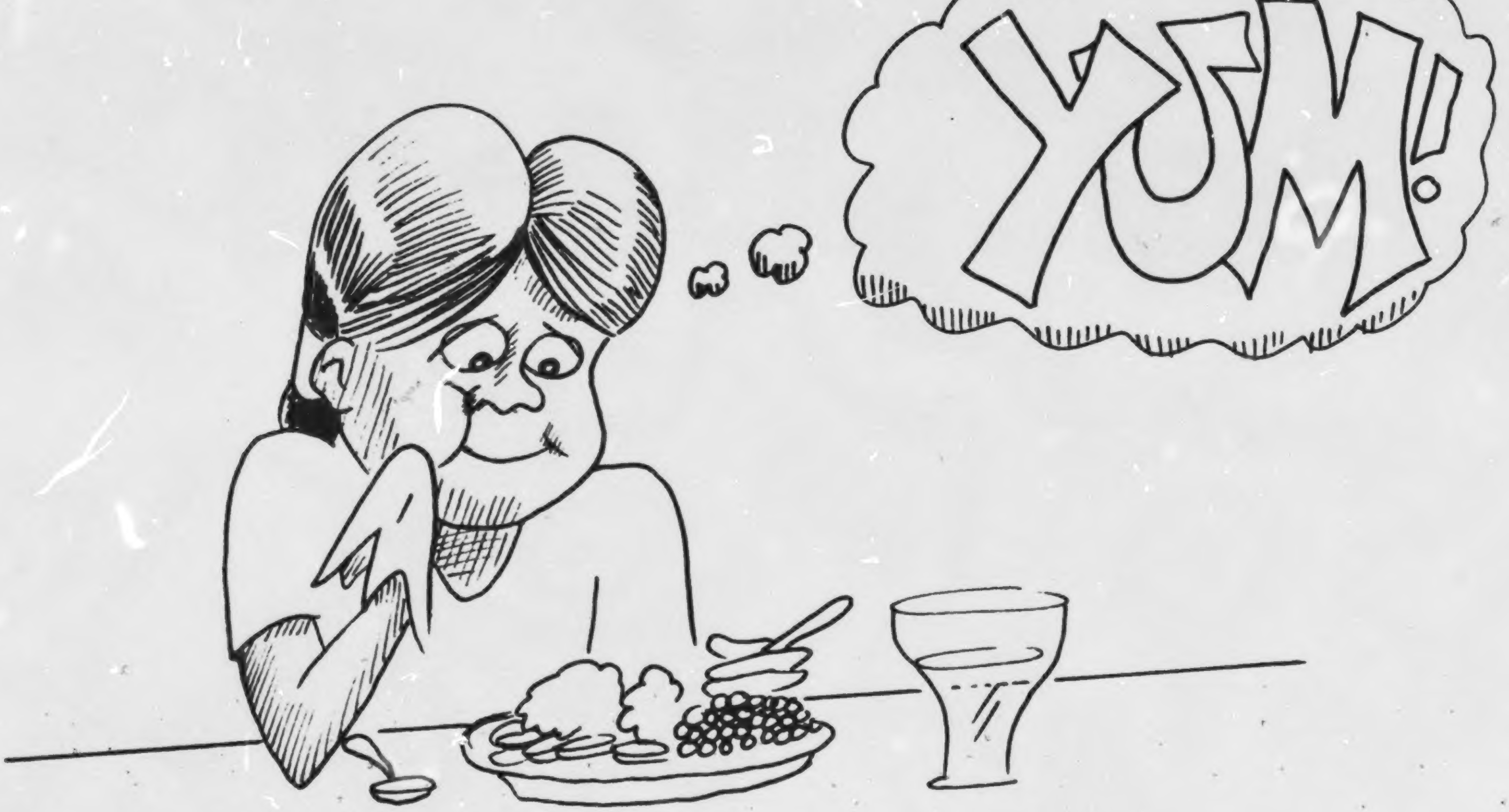
4-6: Have students keep a record of the number of hours they watch television, listen to the radio, or play electronic games. Calculate the totals and then the average per person.

1-91


PRESENTING...
SUZIE...
... AND
HOW SHE
CONSUMES
ENERGY

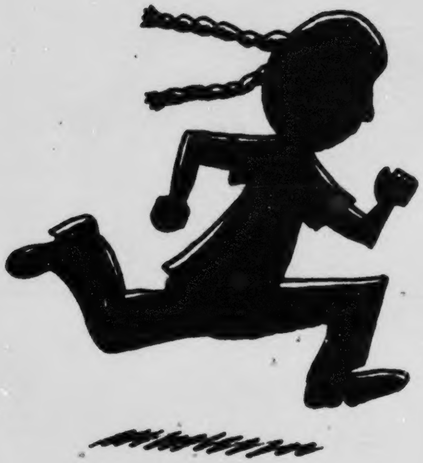
LESSON 3-1: PICTURE 1-1

LESSON 3-1: PICTURE 1-2

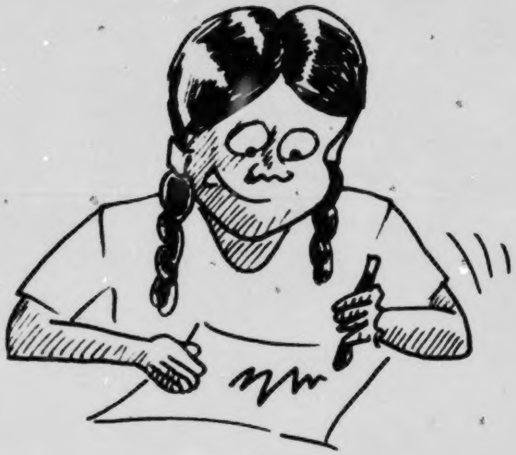


LIKE ALL OF US, **SUZIE**
GETS **ENERGY** FROM FOOD...

... AND, LIKE ALL OF US, SHE USES UP THAT ENERGY *PRETTY* *__FA__ST*...

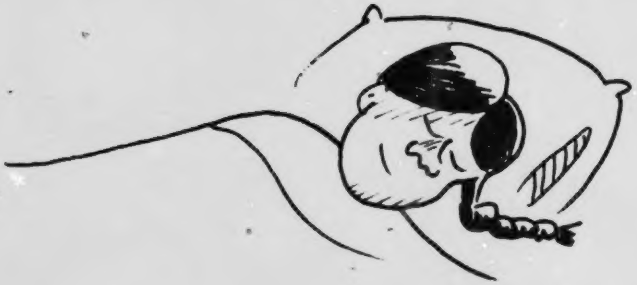


... SHE RUNS...



... SHE __COLORS__ ...

... AND WHEN SHE'S OUT OF ENERGY...

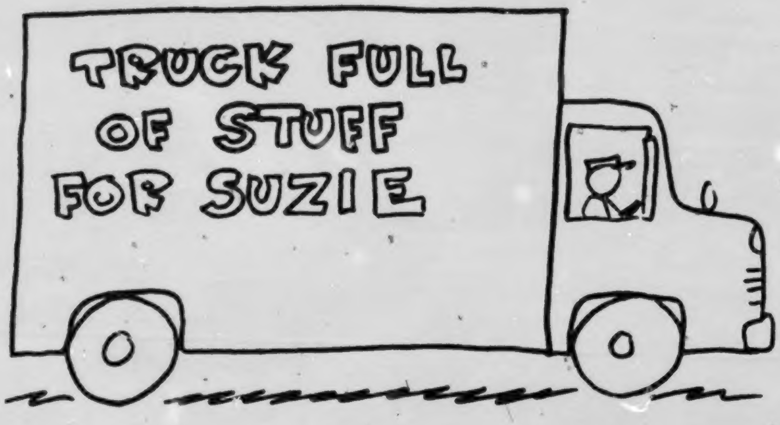


... SHE SLEEPS!

1-93

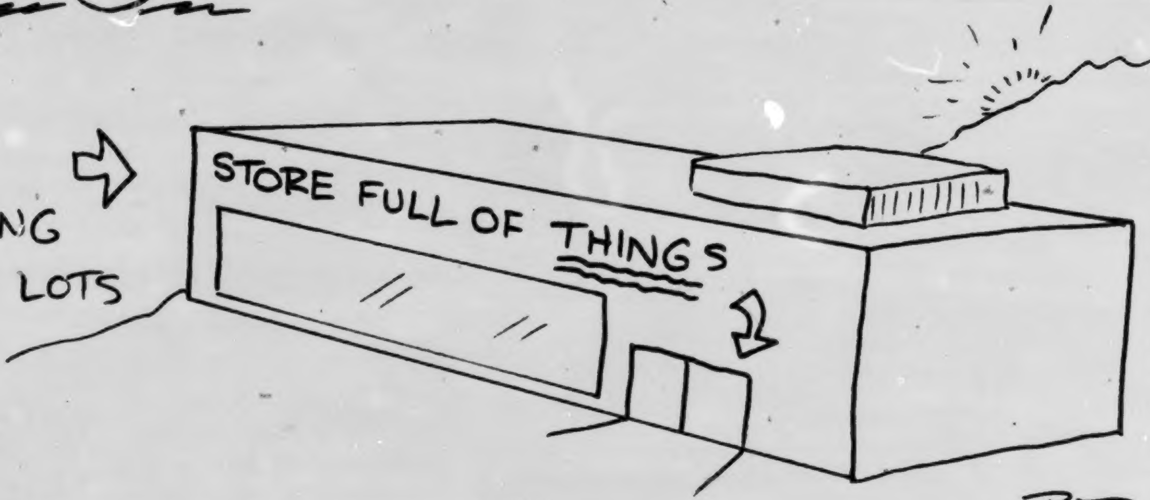
LESSON 3-1: PICTURE 1-3

... BUT THERE'S MORE! ALL OF THE THINGS THAT SUZIE USES ALSO USE MORE ENERGY! LOOK!


TRUCK FULL OF STUFF FOR SUZIE

... THIS BIG TRUCK BURNS GASOLINE AND OIL ...

... AND THIS STORE HAS AIR CONDITIONING AND HEATING AND LOTS OF LIGHTS!!


STORE FULL OF THINGS

ENERGY IS EVERYWHERE!!

PETT
THE END

LESSON 3-1: PICTURE 1-4

LESSON 3-2: PEOPLE ARE ENERGY SHOPPERS

Rationale

There are at least three dimensions to the energy consumer role. Here we will talk about energy shoppers, energy users and energy disposers. This particular lesson introduces students to the shopper role. It is important for them to be aware of the fact that almost every time they go into a store they are shopping for an energy product. They need to be wise energy shoppers as one way of responding to the energy problem.

Objective

Students will be aware of how they are energy shoppers on an everyday basis. Teachers can assess the attainment of this objective by the review of this lesson provided in Activity G, or by using Assessment Activity 1 at the end of this chapter.

Main Activity

A. Talk with students about what they do when they "go shopping." Ask them what "going shopping" means to them. Most students will probably talk about going to the grocery store or to the department store. Our purpose here is to get students to see that they go shopping on a regular basis.

B. Now talk with students about how they shop for energy products. Almost everything they buy in the store is in one way or another an energy product. Food is an energy product, clothes are energy products. Use the pictures that accompany this lesson to have students see how they carry out everyday shopper roles and how they normally shop for energy products.

Picture 2-1: Food. In this picture, people are buying food. Food is an energy product. Every time food is bought in the store and consumed, that energy is gone forever. The packages that food comes in are also energy products. They are made from paper and plastics. Normally packaging is thrown away and is not used again.

Picture 2-2: TV. Replacing or buying a television is a major way of consuming energy. Televisions are made from energy. They also use electricity in large amounts on an everyday basis. Buying a television is shopping for an intensive energy user.

Picture 2-3: Cars. When we shop for cars we are making a basic decision about how much energy we will use. As the picture shows, large cars use a lot more energy than small cars.

Toys. Toys are energy products. Some trains and race cars use electrical energy. Other toys are made of wood. Toys made from wood use less energy than electrical toys.

As you talk with students about these pictures, have them refer to cases in which they have done these things. Have them talk with you about the kinds of considerations they made in shopping for energy products. Stress with them that it is important to think about how you buy the energy products that you use.

C. Ask students to bring into class an energy product that they have bought recently. If a student has not bought one, then someone in the family has probably bought an energy product. Have the students talk with that person about what considerations they made in buying that product and how much energy will be consumed when that product is used. Then talk with students about what they find. They should see that there are a wide range of energy products that people buy every day and that they do, indeed, use a lot of energy.

D. Ask students to paint some pictures or make sand drawings of objects that they buy or want to buy that are energy products. Have them think about the amount of energy that will be used and what questions they need to ask about shopping for energy products that they desire.

E. Now talk with students about how everyone needs to be a careful shopper. Tell them that people who shop with their families often make lists and count prices so that they can determine how to shop wisely. Students also need to shop wisely for energy products. They should at least ask themselves the following three questions:

1. Do I need this product?
2. What are the contents of this product?
3. What is the price of this product?

Take one product that is available in the classroom and talk with students about the meaning of each of these questions and how the questions will help them to be careful energy shoppers. Then have them go home and ask their families these three questions about the energy product that they brought into class. Have them determine whether it was needed, what its content were, and what price they paid for it.

F. Bring someone into class who knows something about products and shopping. Have that person bring a series of products to the class and talk with students about what it means to be a wise energy shopper. This discussion should promote students' interest and knowledge about the contents of products and about wise shopping habits.

G. Talk with students about how they need to be careful shoppers. Saving energy is important. It will often save on price. Then review with students the questions about careful shopping along with a fourth question. They should know whether they need the product, what its contents are, and what its price is. They should then add a question of "How can I save energy using this product?" Tell students to keep their questions in mind and to report back to you after they go shopping next time whether or not these questions helped them to be more careful energy shoppers.

Grade Level Adaptation

2-3: Help students to develop their own shopping list and pick out the energy products which are available on it. Then have them ask the questions about careful shopping. See if they can cross out items or change on their list items in order to be more careful energy shoppers.

4-6: Have students make a class shopping list and demonstrate how they can save energy products that are found on the list.

Language Arts Adaptation

K-1: Ask students to act out various roles of people shopping in grocery stores, retail stores, and other places in their town. Have them talk about how they might save energy.

2-3: Have students make their own shopping list and write out the words on the list. Check their lists for spelling and punctuation.

4-6: Have students design their ideal shopping list, making it the most economical that they can in terms of energy use. The ideal list will probably be shorter than their original list, and it will contain fewer intensive energy users. Have students write beside each item why it is a better item to shop for than others in terms of energy use.

Math Adaptation

K-1: Help students to make a stack of energy products that are in their desk or where they keep supplies and use a ruler to determine how high the stack is. They should be able to see that the energy products in their desk can make quite a high stack, and they will be able to practice reading a ruler.

2-3: Ask students to count the number of items on their shopping list before and after they think about saving energy. Have them determine how much energy they save in terms of the number of items on their list by subtracting one list from another.

4-6: Ask students to make a series of alternative shopping lists from high energy consumption to low energy consumption. Have them come up with mathematical representations of the energy savings on their ideal lists compared to others. You can use whatever math function you are currently teaching in order to implement this idea.

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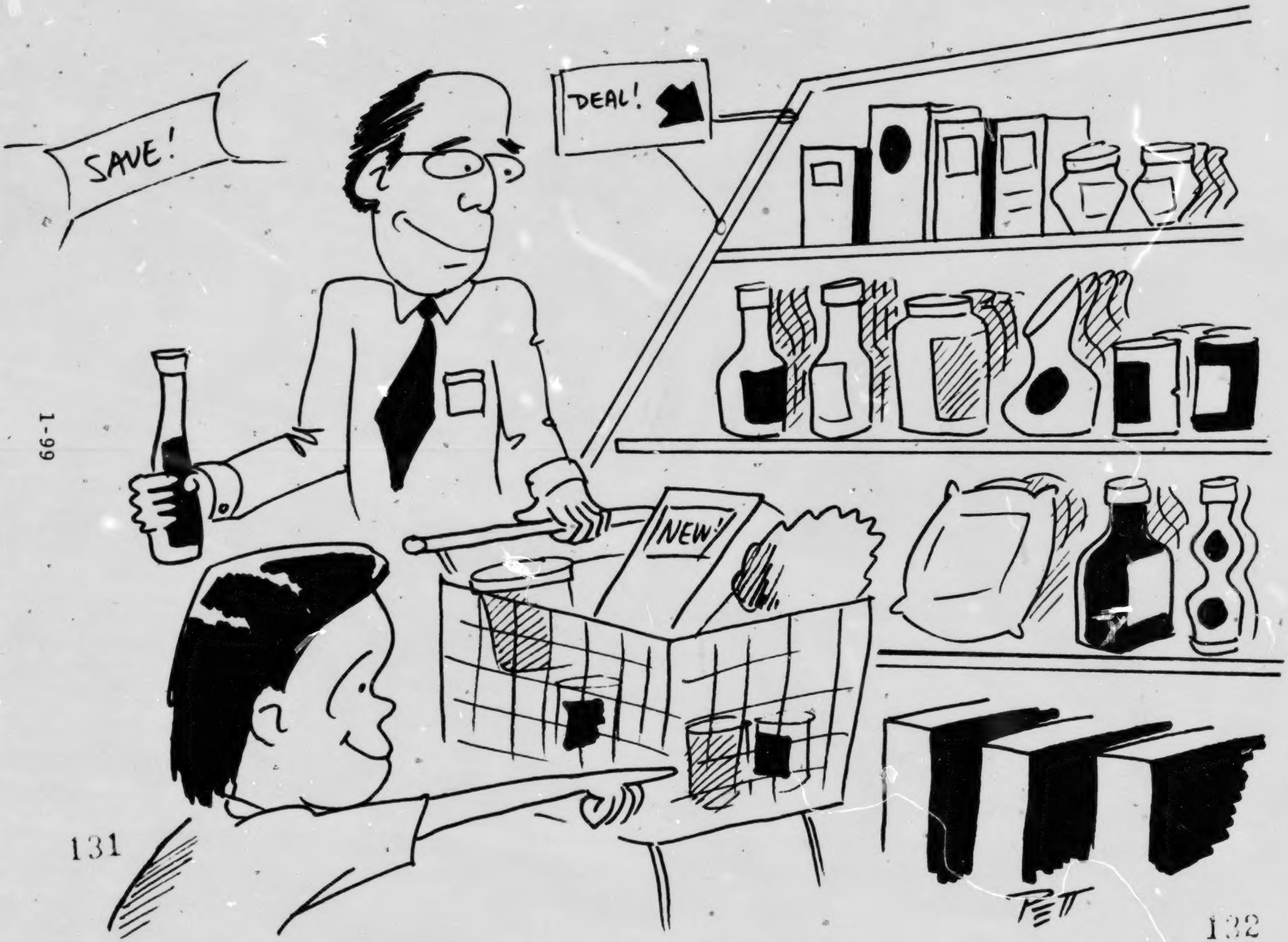
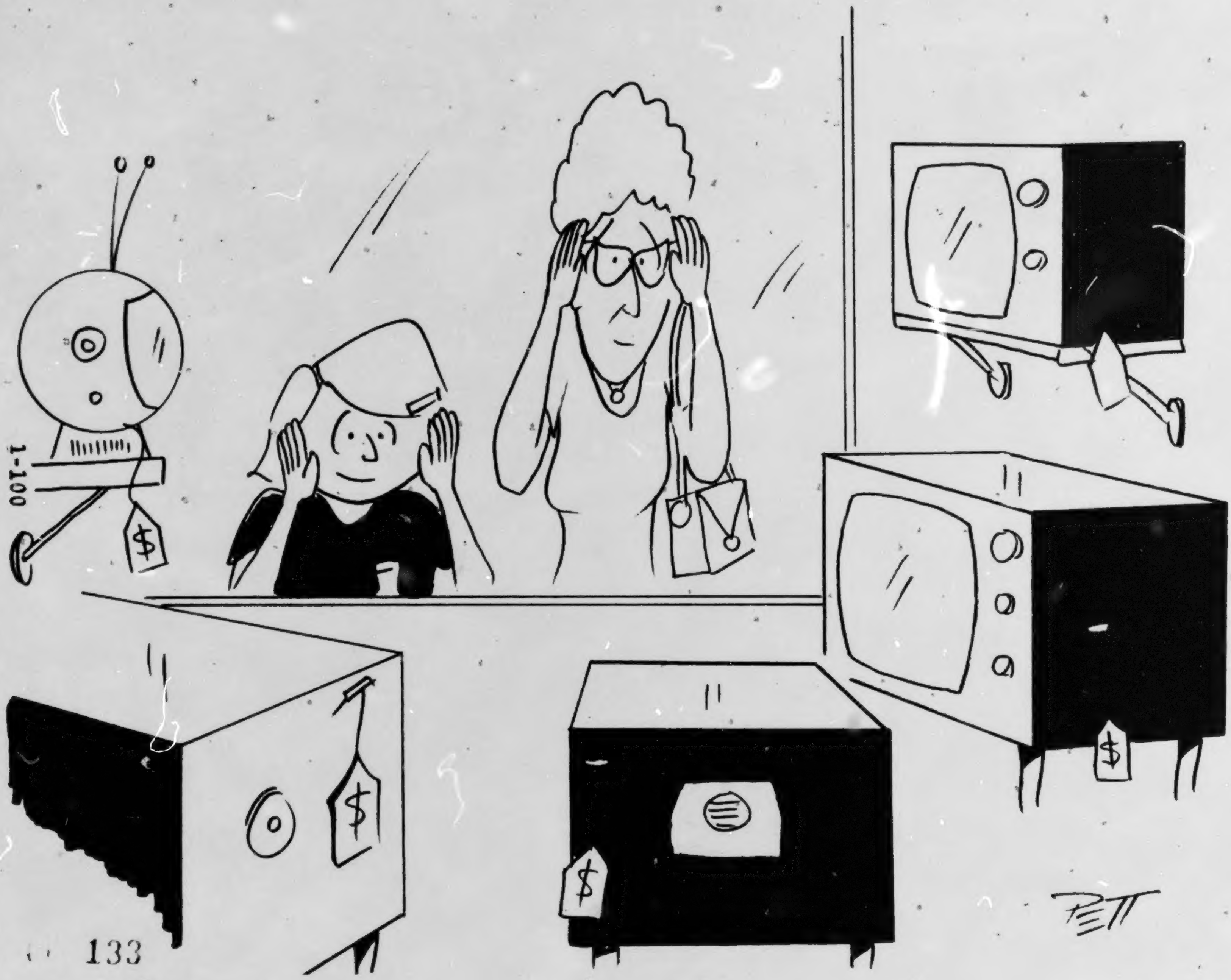
1-99


SAVE!
DEAL!
NEW!
PETT

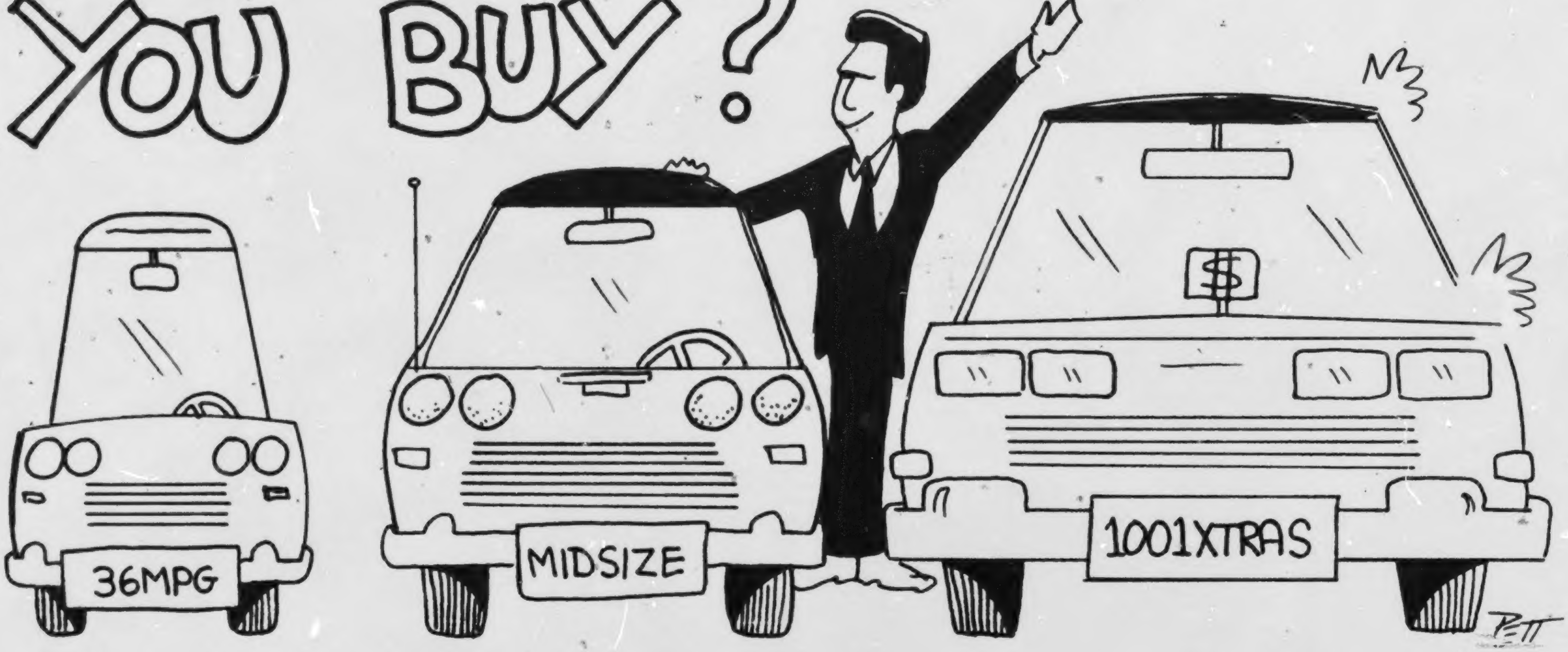
LESSON 3-2: PICTURE 2-1

1-100



LESSON 3-2: PICTURE 2-2

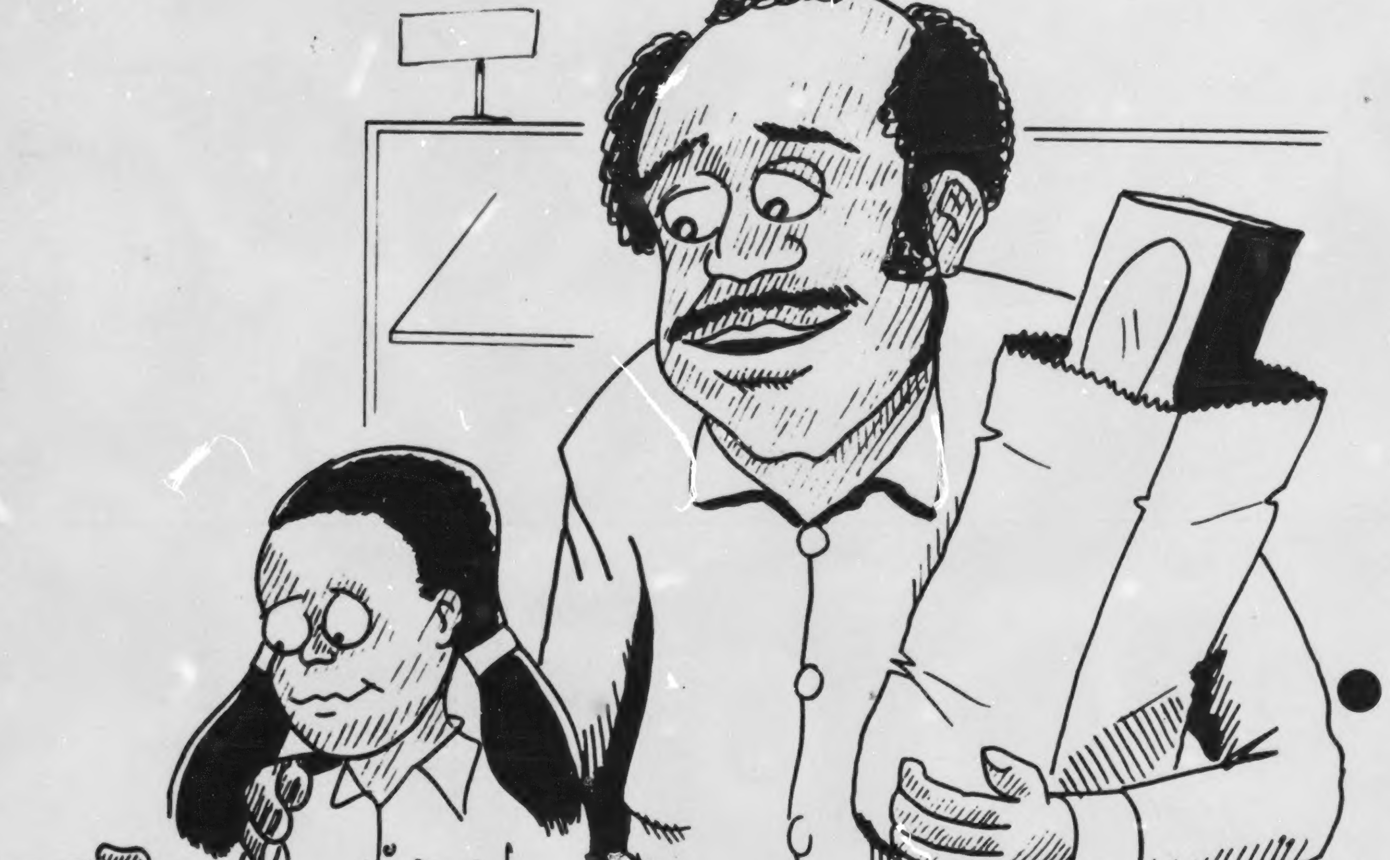
WHICH CAR WOULD YOU BUY?


36MPG
MIDSIZE
$
1001XTRAS
PETT

• CHEAPER	• MORE EXPENSIVE	• VERY EXPENSIVE
• ENERGY SAVER	• MEDIUM ENERGY USER	• BIG ENERGY WASTER
• NOT MUCH ROOM	• MORE COMFORTABLE	• MOST COMFORTABLE

1-101

LESSON 3-2: PICTURE 2-3


RACE!!!
10
ELECTRIC.!!

LESSON 3-3: PEOPLE ARE ENERGY USERS

Rationale

In the same way they must be careful shoppers of energy products, students must also be wise energy users. After a product is bought, it needs to be used in careful ways. It should be used completely, and over as long a period of time as possible.

In this lesson, students will become aware of the uses of energy products and how important it is to take care of energy while they are using these products. They will apply their ideas to their classroom and to their homes. This is a first step in helping students to become aware of one dimension of their consumer roles.

Objective

Students will become aware of themselves as energy users. Teachers can assess the achievement of this objective by students' responses to Part E of this activity, or by using Assessment Activity 1 at the end of this chapter.

Main Activity

A. Talk with students about common articles that they buy for their class. They may buy pencils, crayons, paints, and other materials. Have them make a list of the school supplies that they thought they needed when they came to school. Now take one of the supplies, such as a crayon, and talk to students about how they use it. They use it to draw pictures. Sometimes, however, people can throw them away before they even use them. Other people save them for a long time. They may like a particular color or they may want to have it for later on. Still other people will use it once in awhile; others will use it all the time. Students should see that once they buy something, such as crayons, there is a wide variety of ways that they can use it.

B. Now talk with students about how using things is also a part of their energy consumer role. Tell them that what energy products they use, how much energy they use and how often they use them are important questions. Use the following pictures in order to generate a discussion about what energy products are being used in the pictures, how much energy is being used, and how often students think they will use energy products.

Picture 3-1: Using crayons. The student in the picture is clearly using a lot of crayons. She is even throwing one away already without even using it. Students should see that crayons are energy products that are being used. Sometimes they are thrown away before they are used up.

Picture 3-2: Toasters. Toasters are an energy product and they use electrical energy. Sometimes people waste energy by using the toaster when they do not need to use it.

Picture 3-3: Lights. All of the lights in this room have been turned on. A lot of electrical energy is being used, and it is clear that it is being used when no one really needs to use it.

C. Have students color these pictures or draw their own pictures about energy products that they use. You might also want them to make a collage of the pictures of people using energy products that they have bought.

D. Now explore with students different ways to use energy products. You can structure this exercise using a wastebasket from the class. Begin taking items out of the wastebasket. Talk with students about whether or not these items have been carefully used. They may have been thrown away without being used. They may have been used very carefully, so that there is not one inch of paper left to use, or one small stub of a crayon. Some products may also be used often. You can find this out by counting the number of items that are in the wastebasket. Use the wastebasket as a basis for students to see that there is a wide variety of ways that energy products are used. Sometimes they are used carefully and sometimes they are not. It is important that they be used carefully. Examining a wastebasket is only one way that you can see whether or not you are carefully using energy products. (When the author developed this exercise, she did a study of her own wastebasket. The chief violation was that paper was not used on both sides. This may be a common problem with your students. Such paper should definitely be recycled so that it can be drawn on or used in other ways.)

E. Ask students to continue the wastebasket exercise by looking at a wastebasket at home. When they go home, they should check through the items in the wastebasket to see whether or not things are being thrown away before they are used, whether things are being used carefully, and what things are being used a lot. They should report back to class the next day on what they found. Ideally, you would have them bring their wastebaskets to class. This may be an awkward type of arrangement. Practically, you can discuss with students what they found in their wastebaskets that is like or not like what they found at school. Students should see that they can use energy products in various ways and that there is a need to use them carefully.

F. Students should now be introduced to the link between buying and using energy. They should see that there are energy products that they buy and that these must be used. What energy products they buy, how much they use, and why they use them are very important questions.

Students should now go home and discuss these questions with their parents with regard to particular energy product that they have recently bought. They should determine what product it is, how the family is using it and why the family is using it. Sometimes families use a lot of energy products because they must. They are large and they have to use certain things. At other times, they use a lot of energy because they have not thought very much about it. Talk with students in the class about these questions and discover with them what are the major energy products they are using, how they are using them, and why they are using them.

G. Now ask students to use one thing carefully for at least a week. They may want to check their wastebaskets at home for a week and report on the contents to the class. Hopefully, students will find less in their wastebaskets because they are finding ways to use again the materials that they normally throw away.

Grade Level Adaptation

2-3: Have students break into groups around several wastebaskets and have them develop a report on the class use of energy products and give recommendations for energy saving.

4-6: Based on a wastebasket exercise, have the class schedule a debate through which they determine ways energy products are being wasted and can be saved in the class.

Language Arts Adaptation

K-1: Ask students to use puppets in order to talk about how they use energy products in their homes. The puppets can be members of a family, and the uses of energy products can then be shown. Other classmates can indicate ways in which the energy products might be used more carefully.

2-3: Help students to engage in a pantomime about using energy products. Have other students write on a sheet of paper what they think the student who is doing the pantomime is portraying. Then have the students discuss why they came up with the same or different answers.

4-6: Have students develop a creative story which has the wastebasket as the major character. The story should involve the wastebasket's interpretation of energy products that are being thrown into it.

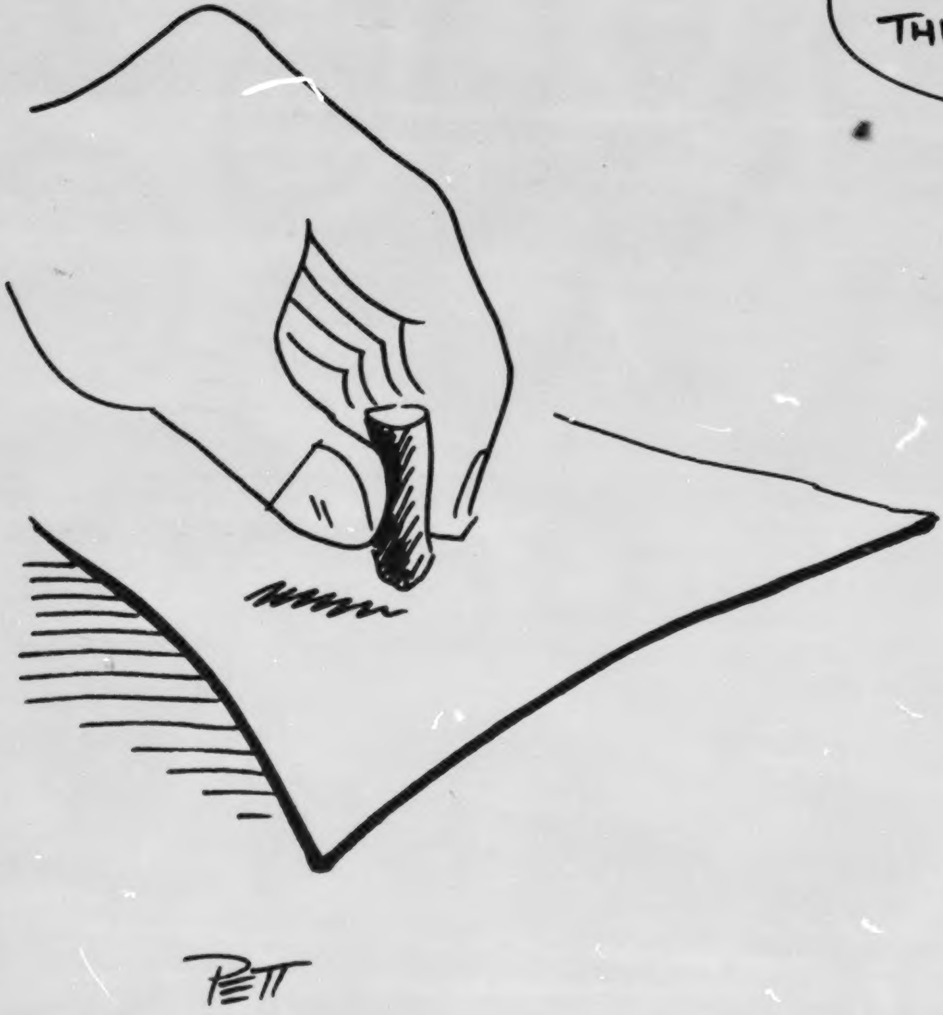
Math Adaptation

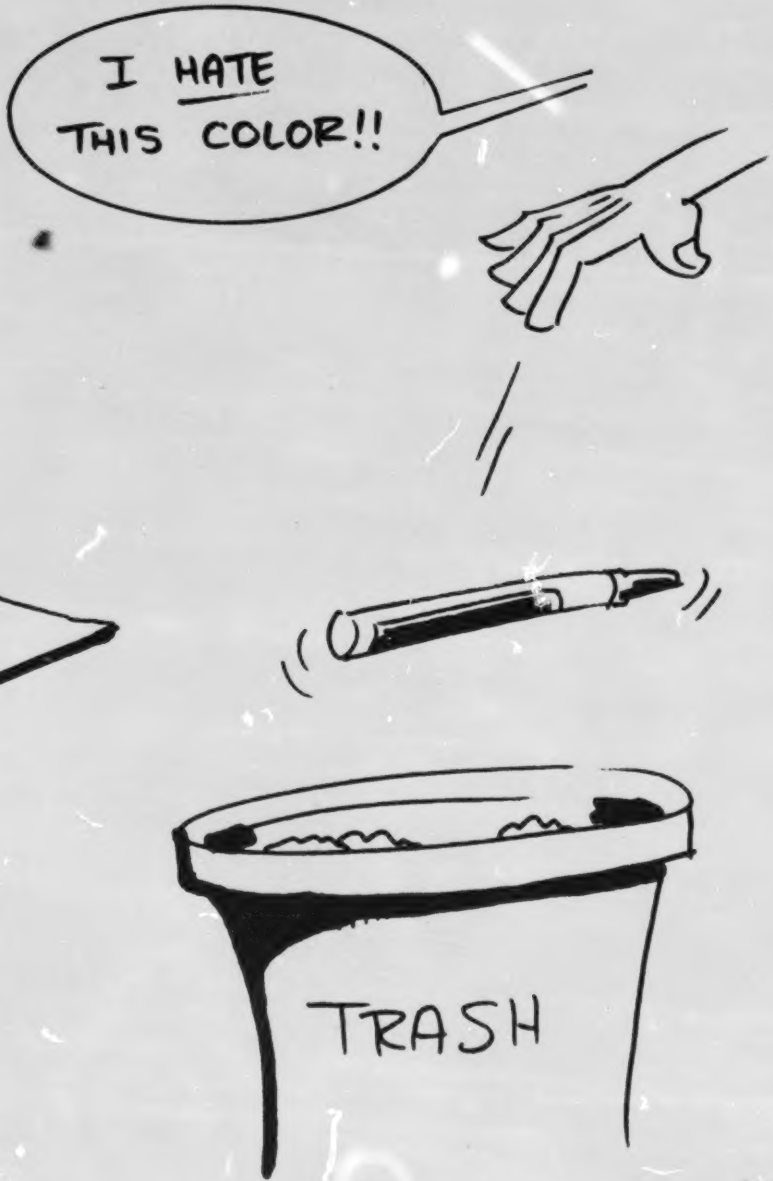
K-1: Talk with students about what particular time of day they think they use the most energy and how they use it.

2-3: Have students check the material thrown into the garbage at home to determine approximately what fraction of it is wasted food and what fraction of it is non-edible packaging.

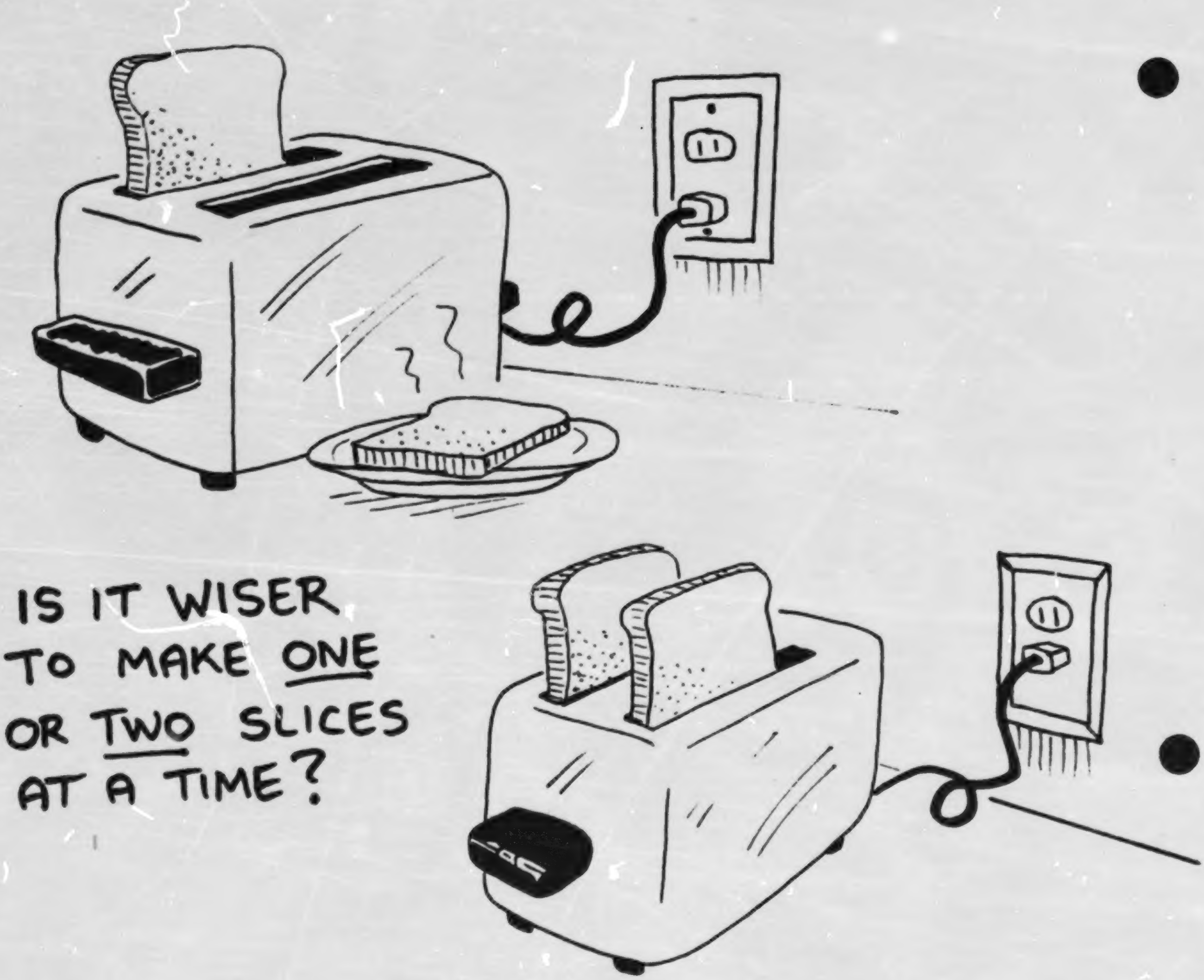
4-6: Have students explore the pounds of wastage that are collected in their community or school by talking with the local garbage collection service. They should be able to study weights and volumes in this exercise. They will be surprised at the amount of energy material that is thrown away as garbage on a daily or weekly basis in their community or school setting.

1-107




I HATE THIS COLOR!!
TRASH

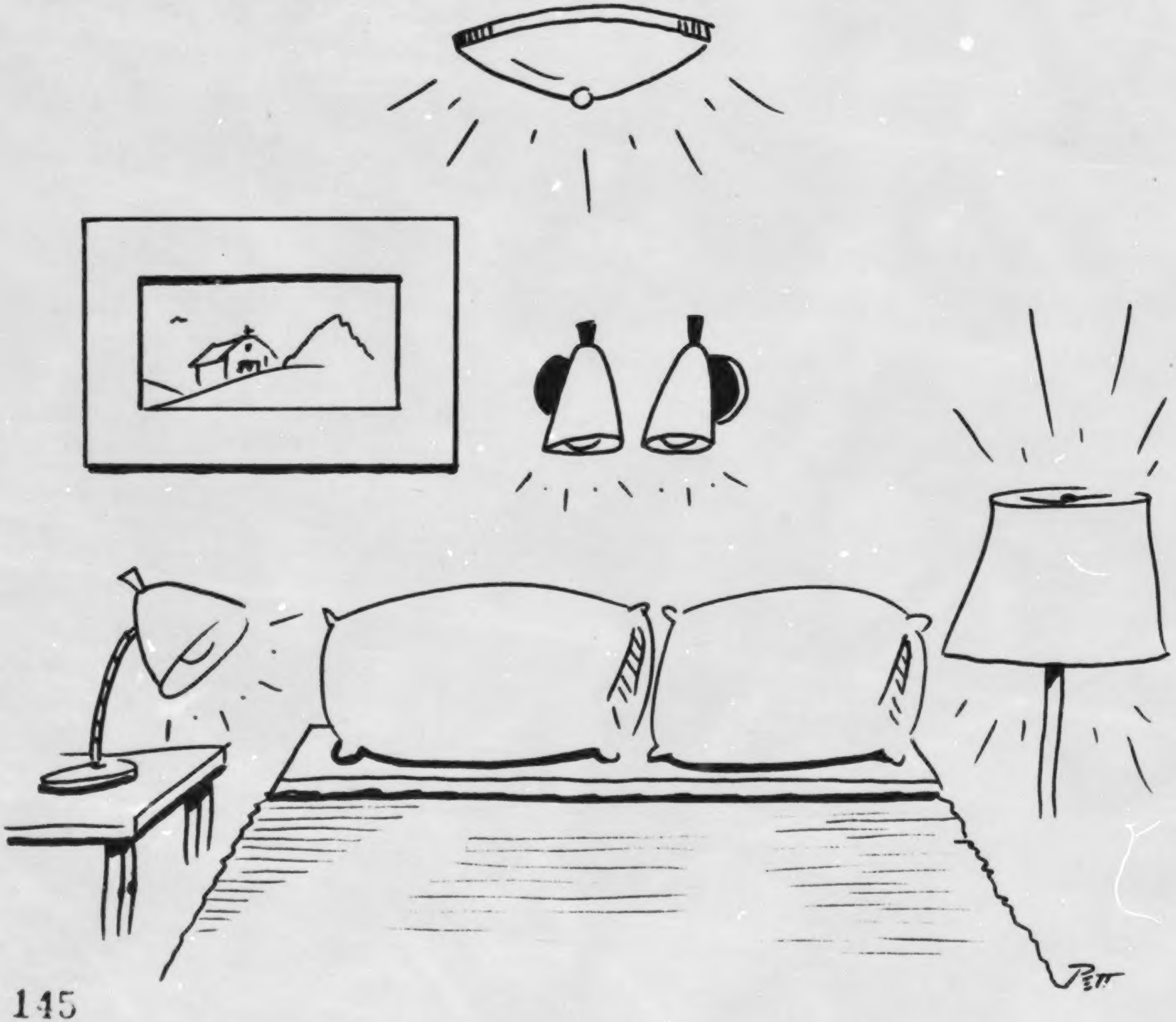
LESSON 3-3: PICTURE 3-1



IS IT WISER
TO MAKE ONE
OR TWO SLICES
AT A TIME?

LESSON 3-3: PICTURE 3-3

1-109



LESSON 3-4: PEOPLE ARE ENERGY DISPOSERS

Rationale

The third dimension of the energy consumer role involves the disposal of energy products. It is as important to know when to dispose of something and where to dispose of it as it is to know about any other dimension of that role. Disposing of energy products is probably the role of which students are least aware of. The purpose of this lesson is to make them aware of how they dispose of energy products and for them to apply their knowledge to their own everyday lives. Hopefully, they will integrate the ideas of shopping for energy products, using energy, and disposing of energy products.

Objective

Students will be aware of their role as energy disposers. Teachers can assess the attainment of this objective by students' responses to Part E of the Main Activity, or by using Assessment Activity 1 at the end of this chapter.

Main Activity

A. Ask students to think about something that they use up every day. Paper is probably a good example. They can use up a lot of paper by drawing, or using it for spelling or math exercises. Most of the time they throw this paper away. There are other uses that can be made of the paper. Both sides can be used; it can be used for scrap paper; it can be used to mop up spills; it can be used as a covering for a desk or a floor if students are doing something else. Talk with them about the many uses they might make of a single sheet of paper. Then talk with them about how, when they throw it away, they can, put it in the wastebasket. They can also stack it up and take it to a place where it will be used again because it will be processed and be turned into new paper. The discussion of paper should make students see that not only do they shop for paper and use it, but that it needs to be disposed of in careful ways.

B. Now introduce students to the idea of disposing, or getting rid of, something. Stress with them how important it is to do this wisely. They need to think about whether or not they need to throw that item away and when they will throw it away. They also need to think about how they will throw it away. Use the pictures that are attached with this lesson for students to see when something will be thrown away and how it will be thrown away.

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Picture 4-1: *Paper*. The students here are using paper. Some students are using it a lot, others, just a little. Some students are throwing it away in wastepaper baskets. Other students are stacking it up so that it can be reused or recycled.

Picture 4-2: *Cans*. Cans contain things and then can be thrown away when empty. But they can also be used again. Metal can be collected and then reused to make new cans or other metal objects. Metal can be stacked in a pile so it can be recycled. Old cans can be used for paint and storage of objects.

Picture 4-3: *Food*. The people in the picture are putting food that they can use again in the refrigerator. Some food is being thrown away. They will only throw away food when it is completely used up and cannot be used again.

Picture 4-4: *Toys*. Here, toys are being fixed. They can be fixed and reused or used by other members of the family. This is an important type of "recycling" in which toys can be used again and again. When they are thrown away, they can often be turned into other products.

C. Take one classroom object that can be disposed of. Talk with the class about whether it should be disposed of when it is totally used, and how it can be disposed of. Have the class devise a plan for how they can make maximum use of the object and then how it will be disposed.

D. Have each student bring in one object from home. Have them talk with their parents about when the objects can be thrown away and how they will be disposed of. When students bring their objects to class, discuss the questions of "when" and "how" with them.

E. Have students draw pictures of objects in their room. Ask them to determine when they will be used up and how to throw them away. Have the class make a collage of their pictures or post them individually on the wall. Then talk with students about the following questions:

1. Who shopped for this energy product? Did they shop for it wisely? (i.e. The school probably paid for the materials. Whether they shop wisely depends upon whether or not paper, for example, needs to be of the weight and quality that you are using.)

2. Was this product used wisely? (i.e. Was it used for every purpose for which it could possibly be used?)

3. How can this product be disposed of in the best way? (i.e. It can be reused for an entirely different purpose. It can be thrown away or recycled.)

F. Have students plan how they can more wisely dispose of the product that they have talked about in their room. Have them draw up a class plan with you about what they will do to help dispose of products more wisely.

G. Have the principal or some members of the school administration visit the class so students can explain their plan and the school administrator can tell them what a good job that they are doing and help to implement the plan in other classrooms.

Grade Level Adaptation

2-3: Have the class collect objects from around the room. Use this as a basis for talking about energy disposal. Then have them involve one other class in developing ways that they might wisely dispose of energy products.
4-6: Have students list all of the objects in the room that they can dispose of. Then have them make a list of objects in the school that they can dispose of. Have them develop a plan for school-wide energy product disposal and then present it to the local administration.

Language Arts Adaptation

K-1: Have students talk into a tape recorder and describe one thing that they have made decisions about in regard to when they will dispose of it and how they will dispose of it. Play back these tapes to the other students.
2-3: Have students draw pictures of people disposing of energy products in careful ways. Have them write a description under the pictures of when energy products are being disposed of and how they are being disposed of.
4-6: Have students develop a song about wise energy product disposal. They should be able to use the song as a theme for their school campaign.

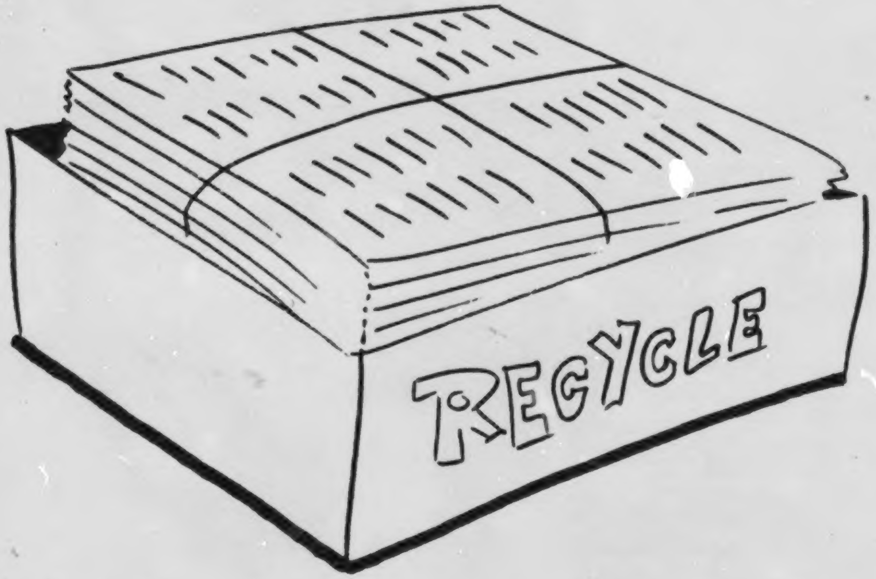
Math Adaptation

K-1: Explain the concept of "half as much" to students in terms of their planning for using half as much paper by using both sides or by using it more intensely.

2-3: Have students total the number of garbage cans or bags their families must dispose of each week. Or have them count the number of cans or bags the school must dispose of each day. They could weigh one bag and multiply by the number of bags to get the weight of daily school garbage.

4-6: Have students measure the material that they saved by their plans for energy product disposal. Explain to them, for example, that by reusing four to five sheets of paper on both sides they can save half of the paper. Teach them the use of fractions by explaining how much more of an object they can use before they dispose of it.

LESSON 3-4: PICTURE 4-1



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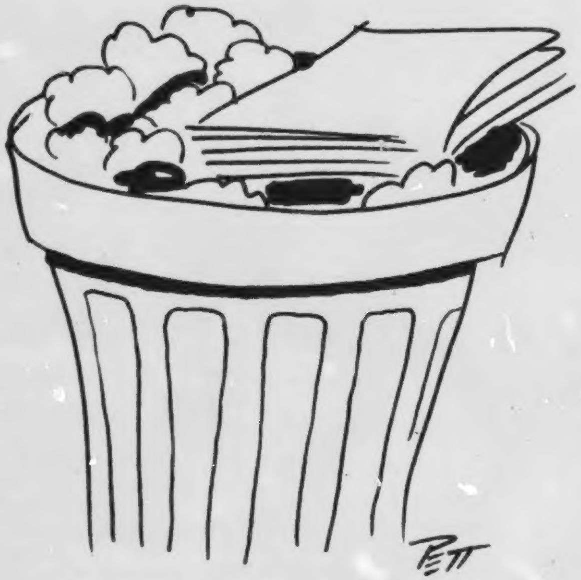

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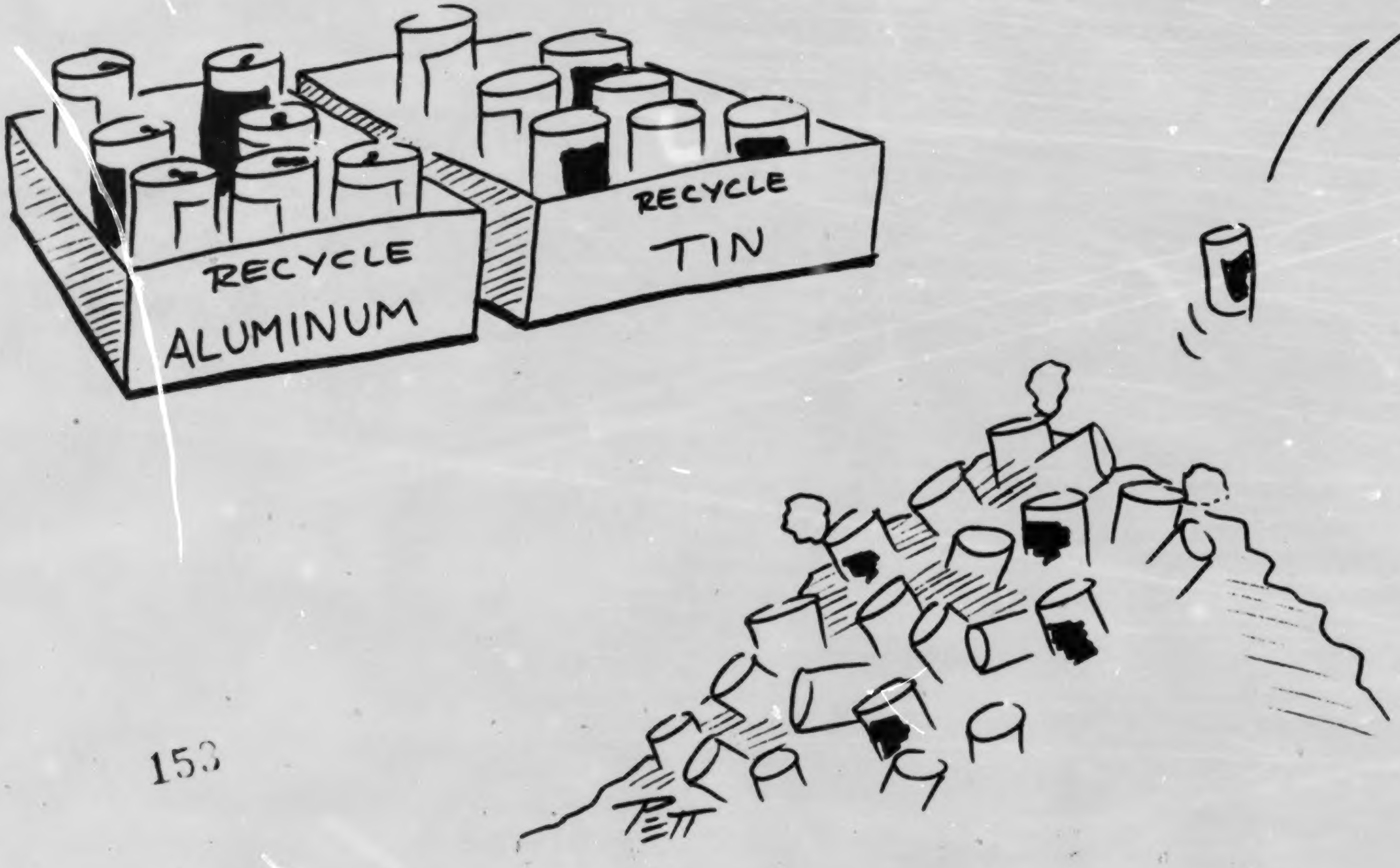
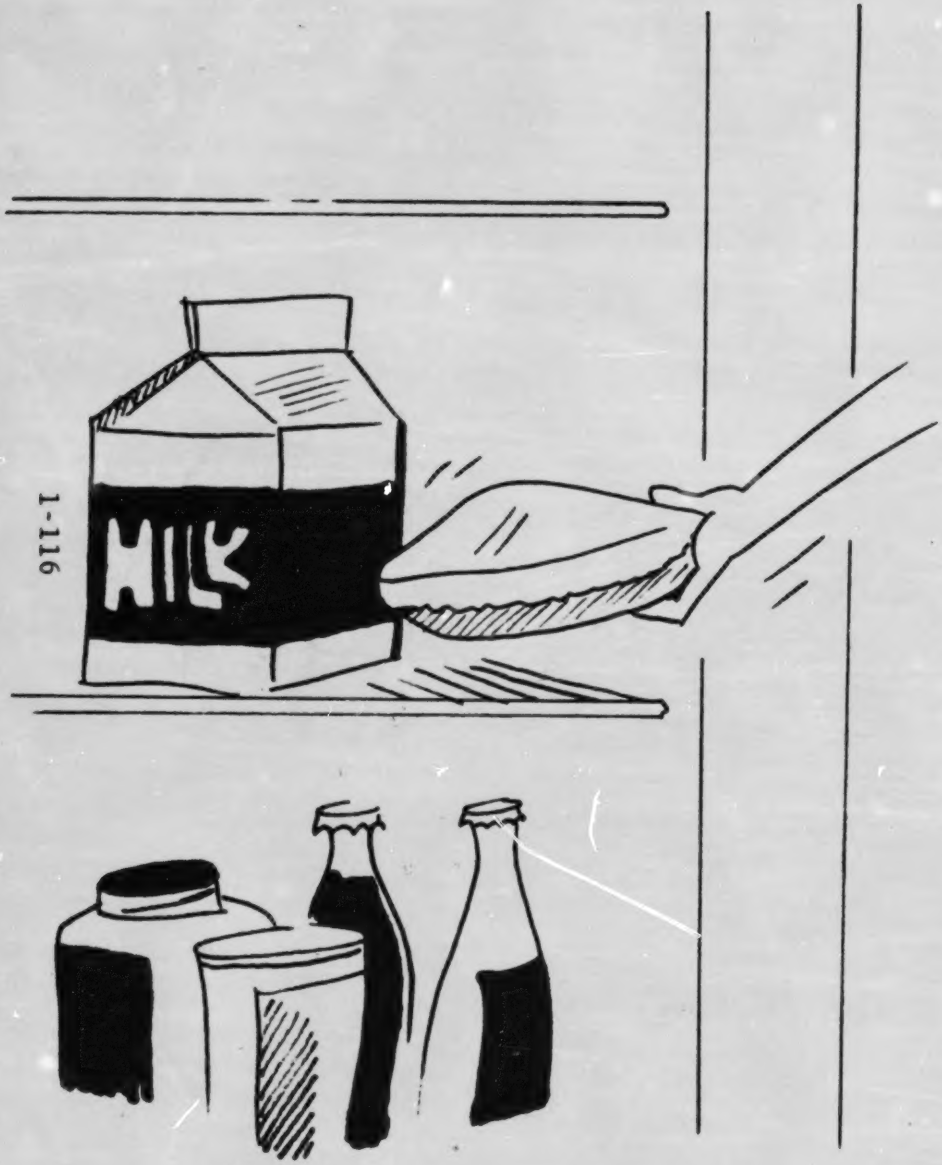
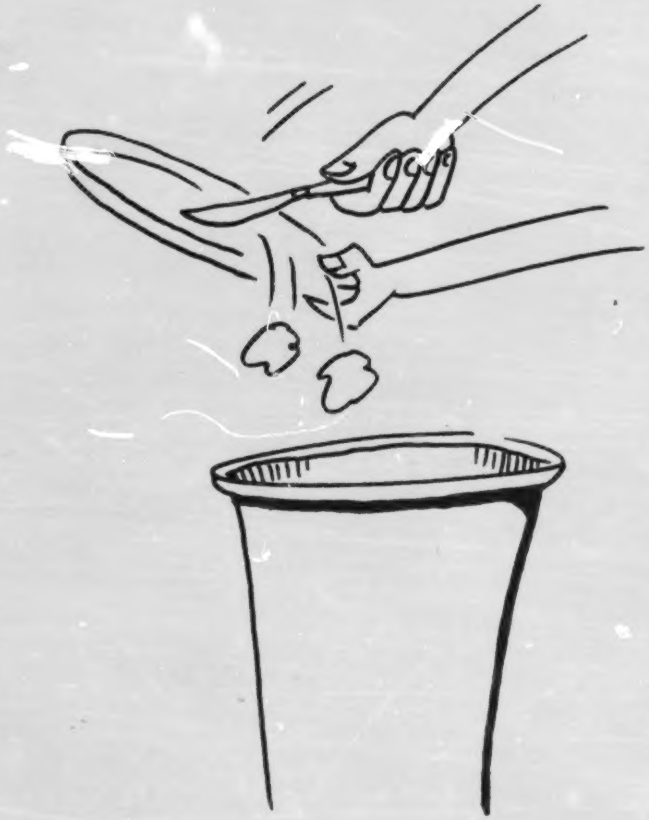
1-115

LESSON 3-4: PICTURE 4-2


RECYCLE
ALUMINUM
RECYCLE
TIN
PETT

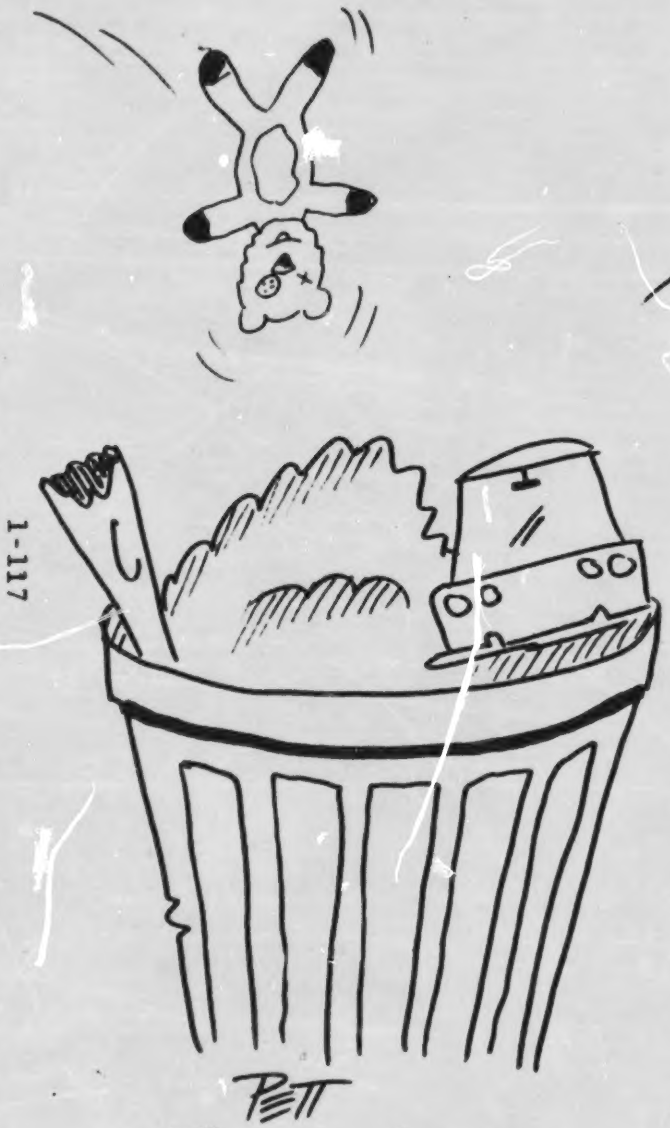
1-116





LESSON 3-4: PICTURE 4-3

LESSON 3-4: PICTURE 4-4



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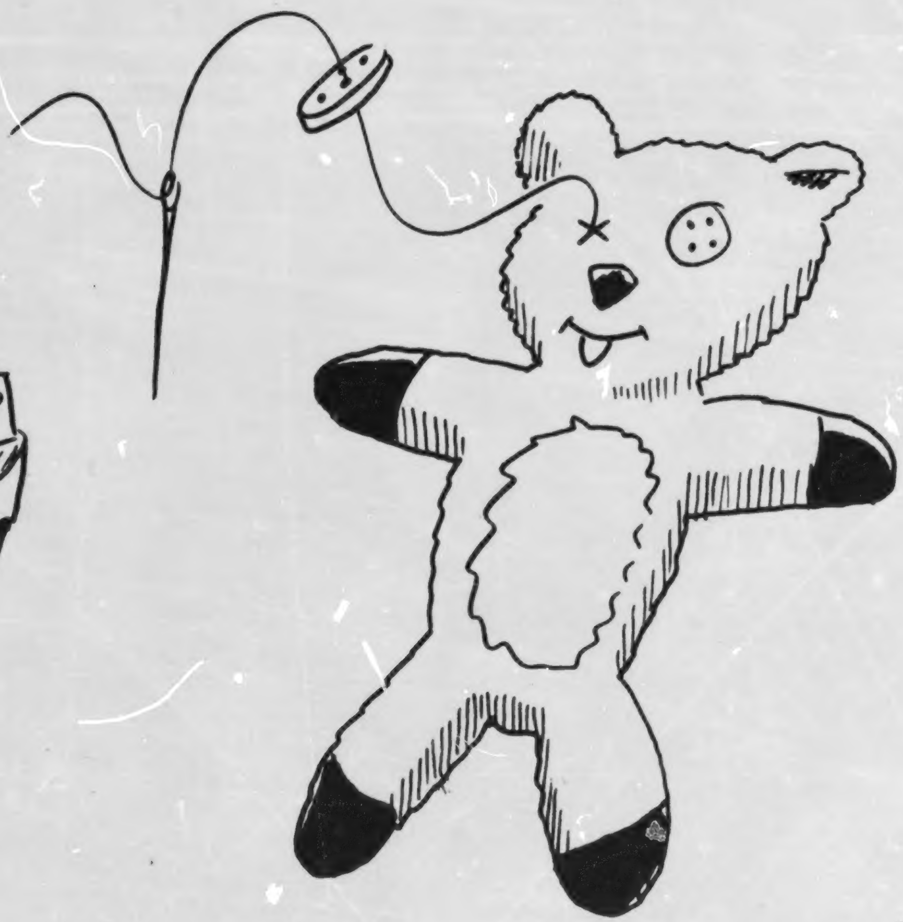

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LESSON 3-5: PEOPLE SOLVING ENERGY PROBLEMS

Rationale

Students have learned about the dimensions of the energy problem. Here they will see how people can do things to help save energy. Students will talk about stories in which young elementary students are helping to save energy.

In order to really help save energy, people must act in some way; they must participate. The lesson is designed to teach students one fundamental participation skill--how to make decisions. Knowing this skill should help them to be more effective energy actors.

Objectives

1. Students will recognize how individuals can help in the energy problem. Teachers can assess the attainment of this objective through student discussion of the pictures and/or stories in Part D of this lesson.

2. Students will know basic decision-making skills. Teachers can assess the achievement of this objective by using student responses to one of the stories as a measure of knowledge, or by using assessment activity 3-2 at the end of this chapter.

Main Activity

A. Use Picture 5-1 and/or read the story about Carla to students as an introduction to how people help to solve energy problems. Structure a discussion that centers around what energy problem is involved in the case and how Carla tried to solve the problem. This activity should be a discovery exercise where students speculate about these questions. There should be no right or wrong answers. The object here is to see how one person can solve a particular energy problem.

B. Use the discussion of Carla as a base for beginning to teach the students some basic aspects of decision making. Ask students what decision Carla made. Write the word "Decision" on the board. Carla decided, or made a choice, to turn off the lights in her room. Ask students what decisions they have made recently. Write their answers under the word. Ask them if they have made any decisions about energy lately. Put those decisions on the board also. Help students to see that everyone makes some kind of decision every day.

C. Now use Pictures 5-2 through 5-5 to help students to see the basic parts of decision making. They involve a story about Leroy and his decision about turning off the TV. You should read the story to students, using the pictures. Then discuss with students these four steps in decision making:

1. What do we need to know? Finding out or knowing involves gathering information about the question you have. Every decision maker must have good information in order to make a wise decision. The boy in the picture has information about how TVs use energy.

2. What can we do? We do not make a decision unless we decide between at least two different things. That is what a choice is. Generally, the more different things you consider, the more comprehensive and better your decision will be. It may be a decision about whether or not to do something. There are often positions in the middle which involve doing a wide range of alternative activities. Usually, how many alternatives are considered depends upon how much information a person has. The boy in the picture is deciding between turning the TV on or off.

3. What do we want to do? Choices involve selecting among different things. Students should select among things based on what seems best to do. The boy wants to save energy, so he chooses to turn the TV off.

4. What happens when we do it? There is an outcome for every decision--a consequence. In this case, energy is saved because Leroy turns off the TV and he plays with his friends.

Students should then discuss these four aspects of decision making in terms of Carla's decision and how she went about making it.

D. Summarize what students have learned about decision making and how important it is for solving energy problems.

Use Pictures 5-6 through 5-8 and/or read aloud the stories about Mike, Rosa, and George to show students models of different people solving energy problems. Hold a discussion with students about the models along the following lines:

1. What is the energy problem here? (e.g., gas usage, heating)

2. How did the students find out about the problem? (e.g., talked with teacher, father, etc.)

3. What different things did the students think about doing? at least two in every case)

4. What choice was made? (e.g., to turn off lights, use a window patrol)

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5. What happened when people did things? (e.g., saving energy, helping others to save)

6. Why is it important to make decisions about energy? (e.g., People will save more; they can help others.)

E. Ask students to make one decision about energy and to act on it this week. Tell them to follow the steps they have learned. Be sure to discuss their actions when they are finished in terms of the parts of decision making, what problems they had, and what energy they saved.

Grade Level Adaptation

2-3: You may want to collect your own pictures and help students to read the stories.
4-6: Students can use newspaper or magazine articles to illustrate decision making. They can also write essays on an energy decision they made.

Language Arts Adaptation

K-1: Use puppets to act out one of the decisions in the stories or their own decision in Activity E, and help students practice oral and listening skills.
2-3: Have students fill in the lines in Picture 5-2 with their own sentences.
4-6: You may want students to draw up their own profiles of individuals to use as cases for this exercise. They could describe these cases orally or do a written essay, giving descriptions.

Math Adaptation

K-1: Have students measure how much energy they save in the decision they make about energy in Activity E. For example, they use less lights or save more light energy.
2-3: Ask students to describe a decision they made in sentences. Have them count, or add or subtract different alternatives in their decision.
4-6: You may want to do some math calculations on the energy that Mike, Rosa or George might have saved by making an individual contribution to the energy problem. If you can offer some figures for total energy consumption, then you can have students subtract, divide or draw graphs of how individual consumption contributes to the total problem.

CARLA'S DECISION

Carla is in kindergarten at Day Elementary School. She likes school. She also likes learning about energy.

Carla knows that part of the energy problem is the way people use lights. She decided that she would try to change her own ways at home.

Carla wanted to get some information about the energy problem. She talked with her teacher. Her teacher called the local light company. The company told her how much electricity Carla used each day. It was a lot.

Carla then faced a major decision. If she cut using lights in her room, surely her family could help even more. She could sit down with her family and talk about using lights. She could just cut her own use of energy. The family would see how savings could be greater. Finally, she could decide not to bother. After all, no one was making her turn her lights out.

She decided that she would cut her own use of lights, and see whether others might follow her example. She decided that if she tried to tell her family, she would not get anywhere. Her brothers and sisters would not listen to her. She did not want her family to get mad at her.

So Carla tried it out. For one month, she carefully used lights in her home. She used the lights only nine hours per week and cut the family's energy bill by quite a bit. The family became interested in Carla's plan. They began to ask her questions about her use of energy. Soon her brothers and sisters were deciding that they could do the same. Her parents also followed her actions. She helped to conserve energy herself. She had also spread the word to her family through her own actions.

MIKE'S DECISION

Mike is a first-grader at North Beach Elementary School. Mike likes to ride his bike. He also is involved in swimming lessons. Mike learned about energy in his first-grade class. He worried about the amount of gasoline energy used by cars. It seemed as if everybody drove cars everywhere, even if it was just down the street.

He wondered if he could do something about his own use of gasoline. He was too young to drive, but he did walk a lot. He could do something about family use of gas if he did not ask his Mom and Dad to drive him everywhere.

He talked about the problem with his father. His father said he would help him. For a whole week, Mike and his father counted his use of the family car. When he was being taken to a lesson, or a game, or out for an ice cream cone, he and his father counted how many miles they drove. By the end of the week, he was surprised. He found out that the family actually drove him almost 100 miles per week. There should be some way to cut down on gasoline use.

He then made a decision. He could walk everywhere. He really did not need to have the family use the car. He might decide to walk to a few of the places, and to have his Mom and Dad drive him when it was a longer distance. Finally, he could try to get his parents or neighbors to save on their gasoline use.

Mike decided not to try to change his parents or neighbors. They might not think it was very important. He did think that he could try to walk more.

Mike tried it for a week. He began walking everywhere. He walked to baseball practice. He walked to his swimming lesson. Soon he found that his friends began to walk with him. It was a lot of fun.

Mike liked his decision. His parents were very happy. His friends enjoyed walking with him. They, too, were saving energy for their families.

ROSA'S DECISION

Rosa is a first-grader at Woods Elementary School. She was learning about the energy problem in her class. She felt that there was a way that the school could help.

She wondered what to do. Rosa decided to talk to her teacher. He said that one of the major ways the school used energy was through heating. Woods School was in a town where it was cold and the heat was turned up to 75-80 degrees in the winter. He said that the heat could probably be cut down. It would save the school a lot of money. People would only need to agree to dress more warmly.

Rosa thought about the problem. She remembered what her teacher said about cutting down the heating.

She could start a window patrol. Windows were often left open in the school while the heat was on. During recess, doors were often left open while the heat was on in the winter. She could also try to get people to wear sweaters and turn down the heat. Rosa talked with some other students. They made a plan. They wanted the students to patrol the opening of windows and doors.

Rosa took the plan to her principal. The principal agreed. Students in each class were put in charge of the energy use. There were very few windows and doors left open during the winter. The patrol did a good job.

The plan worked. The school cut down its heating bill because of the students' energy ideas.

GEORGE'S DECISION

George is a third-grader at Central Elementary School. He was learning about energy in his science class. George found out that dishwashers were one of the major appliances that used energy.

The dishwasher was used a lot in George's home. The family had five children, and there were a lot of dishes after every meal. They also were about to get a new dishwasher. George talked with his mother. She thought it was a good idea to try washing the dishes and delay getting a new dishwasher. They went to the local appliance store. They found that their dishwasher used a lot of energy, and any new one would use a lot, too.

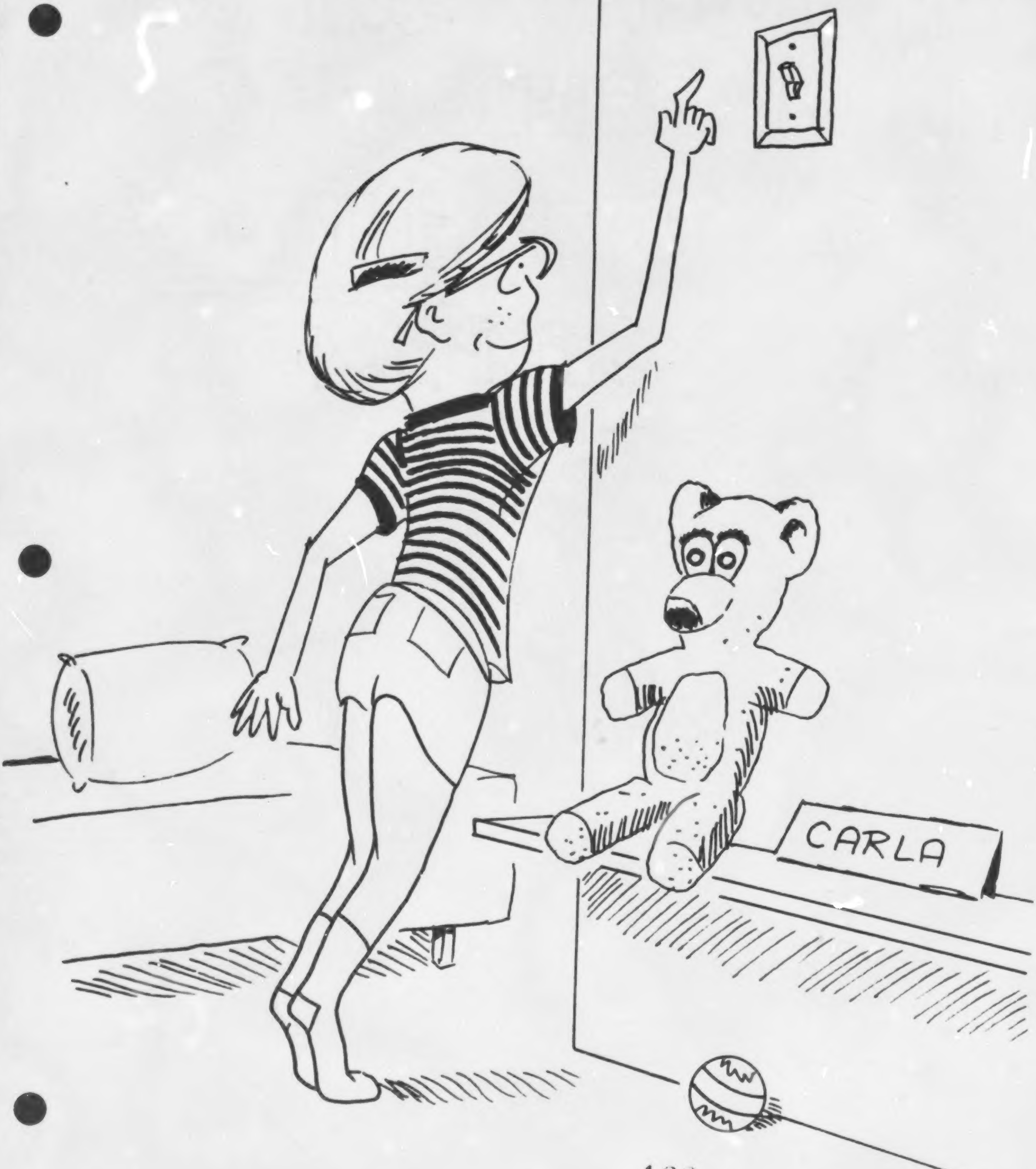
George wanted to cut back on the use of the dishwasher, but it was difficult to think of a plan. He could do the dishes, but he did not want that! After all, doing that many dishes every day was going to be hard. He thought that he might ask his sister Alice, who was 14, to help him do the dishes.

He talked to Alice about his plan. Alice was not happy at first. She said she would rather dry the dishes than wash them. She said that she would try it for a week. If it worked out well, then they could do the dishes together. George's mother was very pleased that Alice would help. Maybe they wouldn't need an expensive new dishwasher.

It did work. Alice and George enjoyed doing the dishes. They talked to each other about what had happened at school and with their friends. Soon, their sister Mary was also part of the dishwashing team. This way, when someone had a game or some other activity they wanted to do, others could do the dishes for him or her.

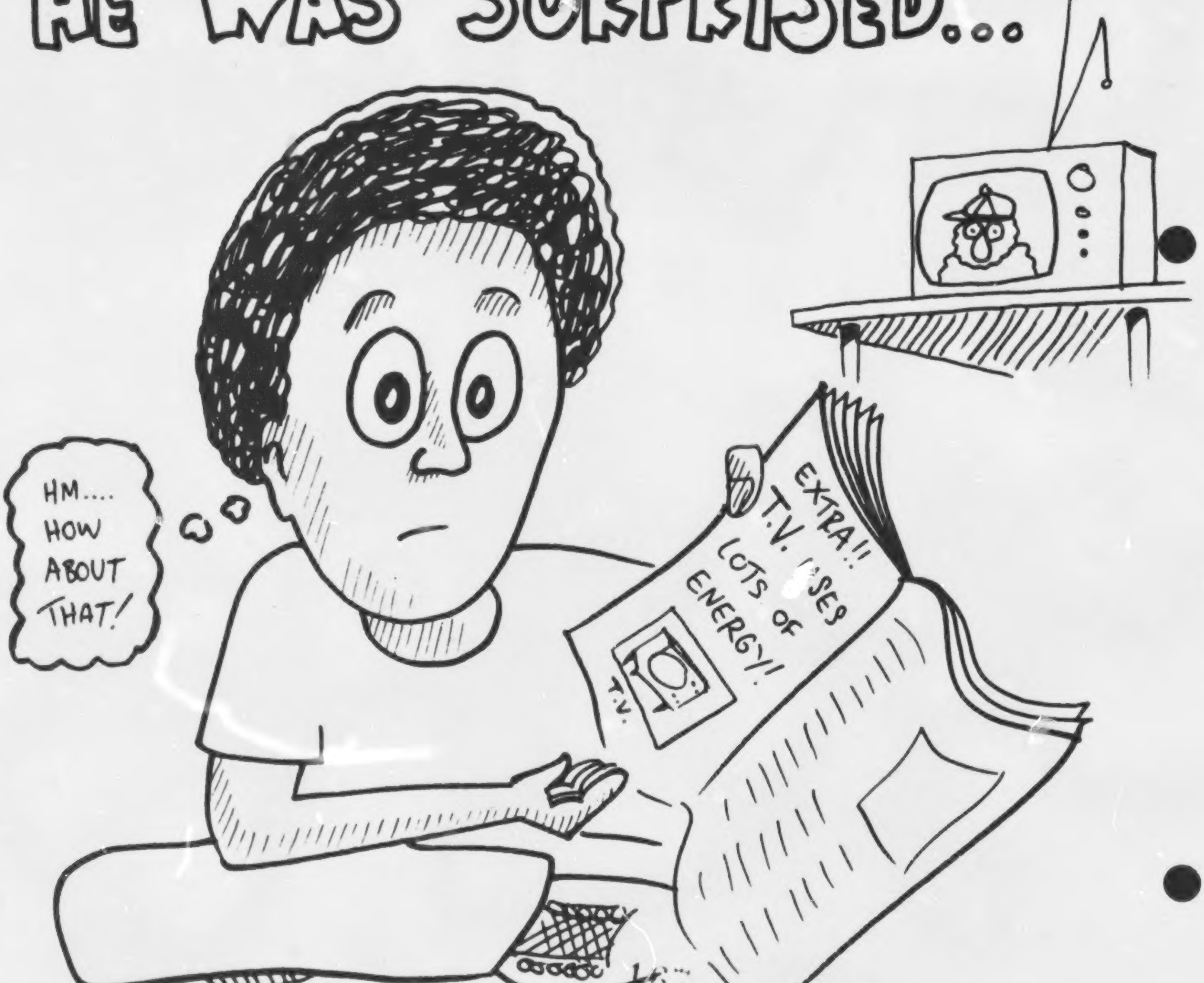
George's decision worked. They saved $5.00 that month on their energy bill. Soon, the whole family was helping. They never did buy the new dishwasher.

LESSON 3-5 PICTURE 5-1

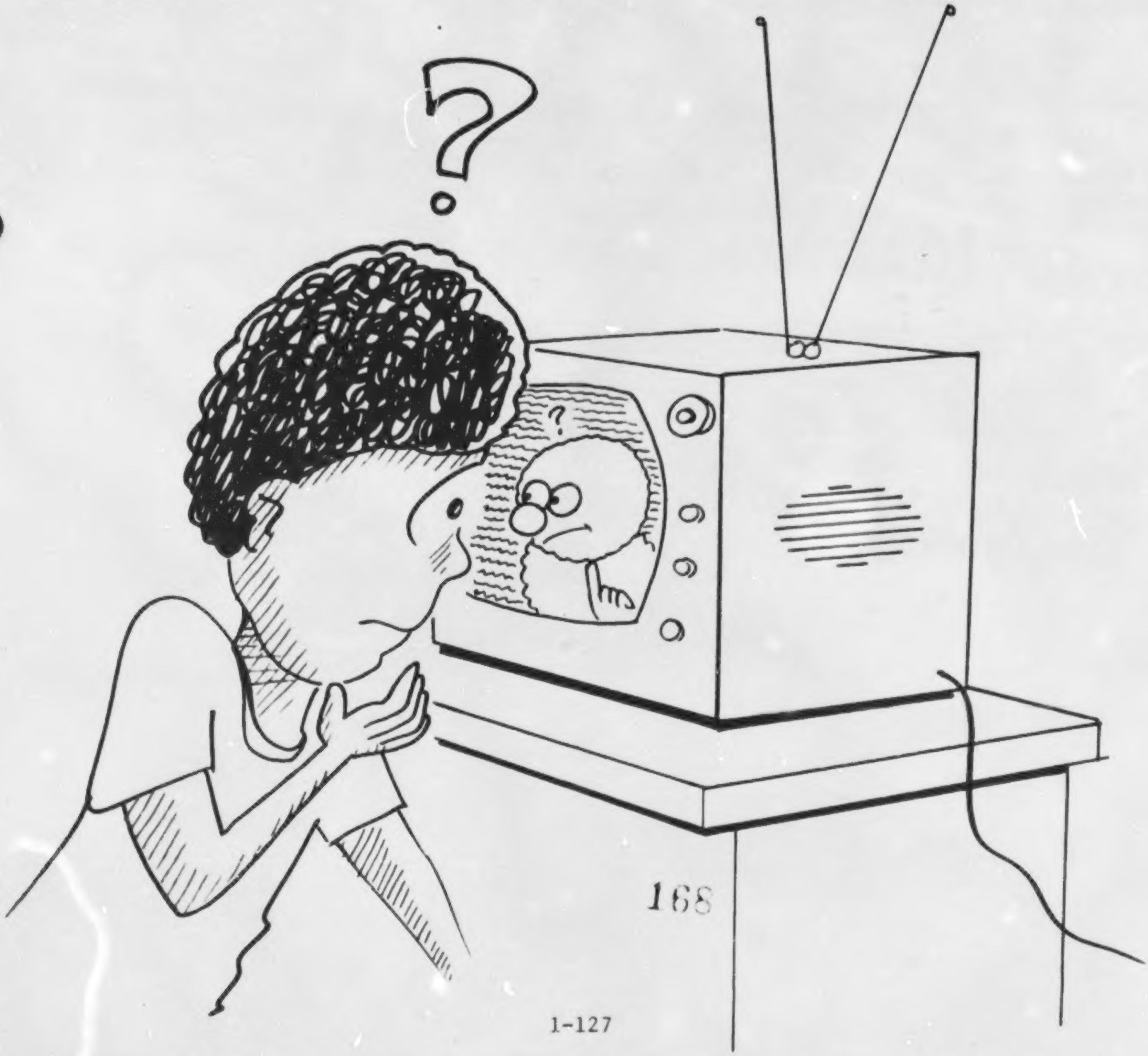


LESSON 3-5: PICTURE 5-2

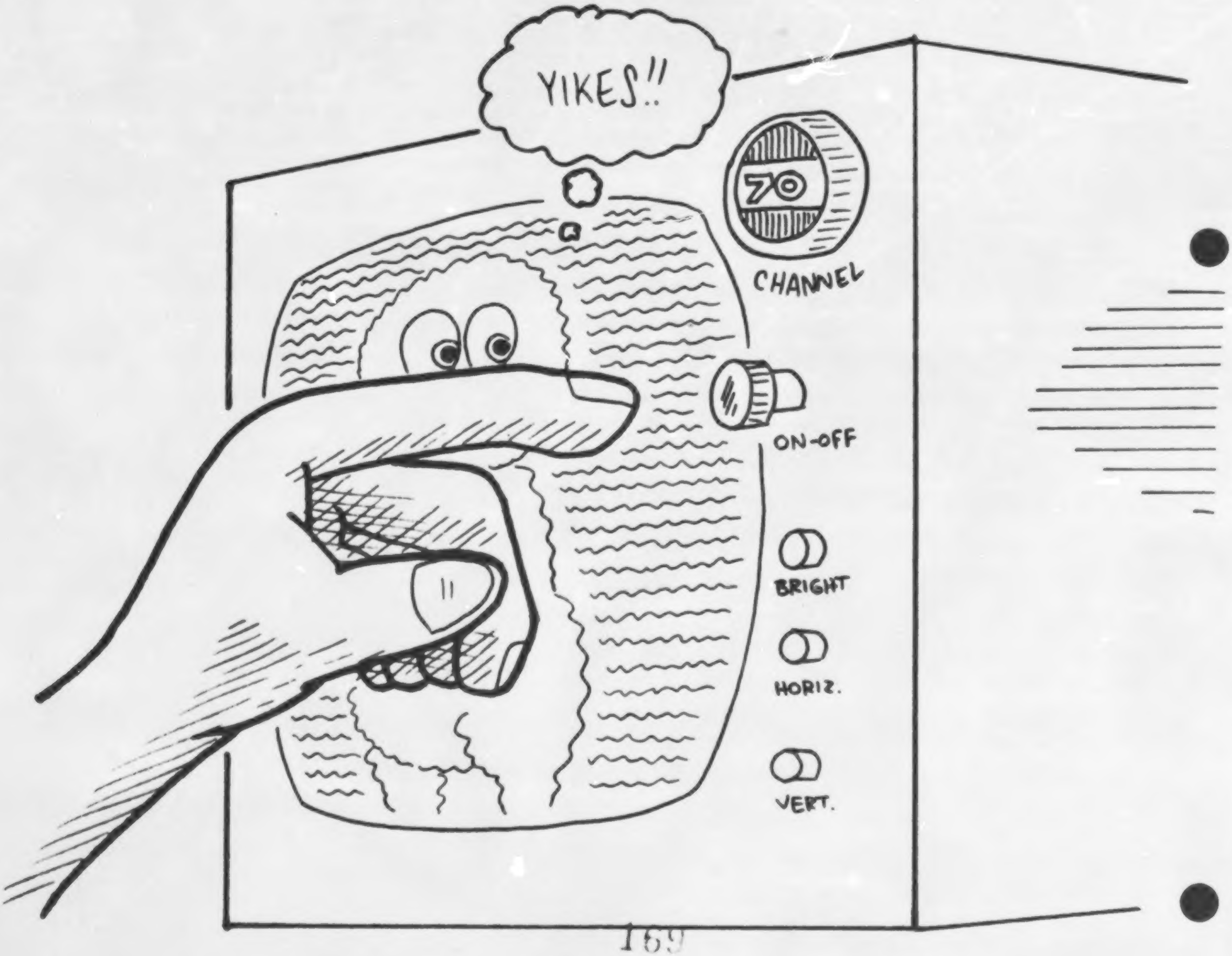
WHEN LEROY FOUND OUT THAT WATCHING T.V. USES LOTS OF ENERGY HE WAS SURPRISED...


HM.... HOW ABOUT THAT!
EXTRA!! T.V. USES LOTS OF ENERGY!!
T.V.

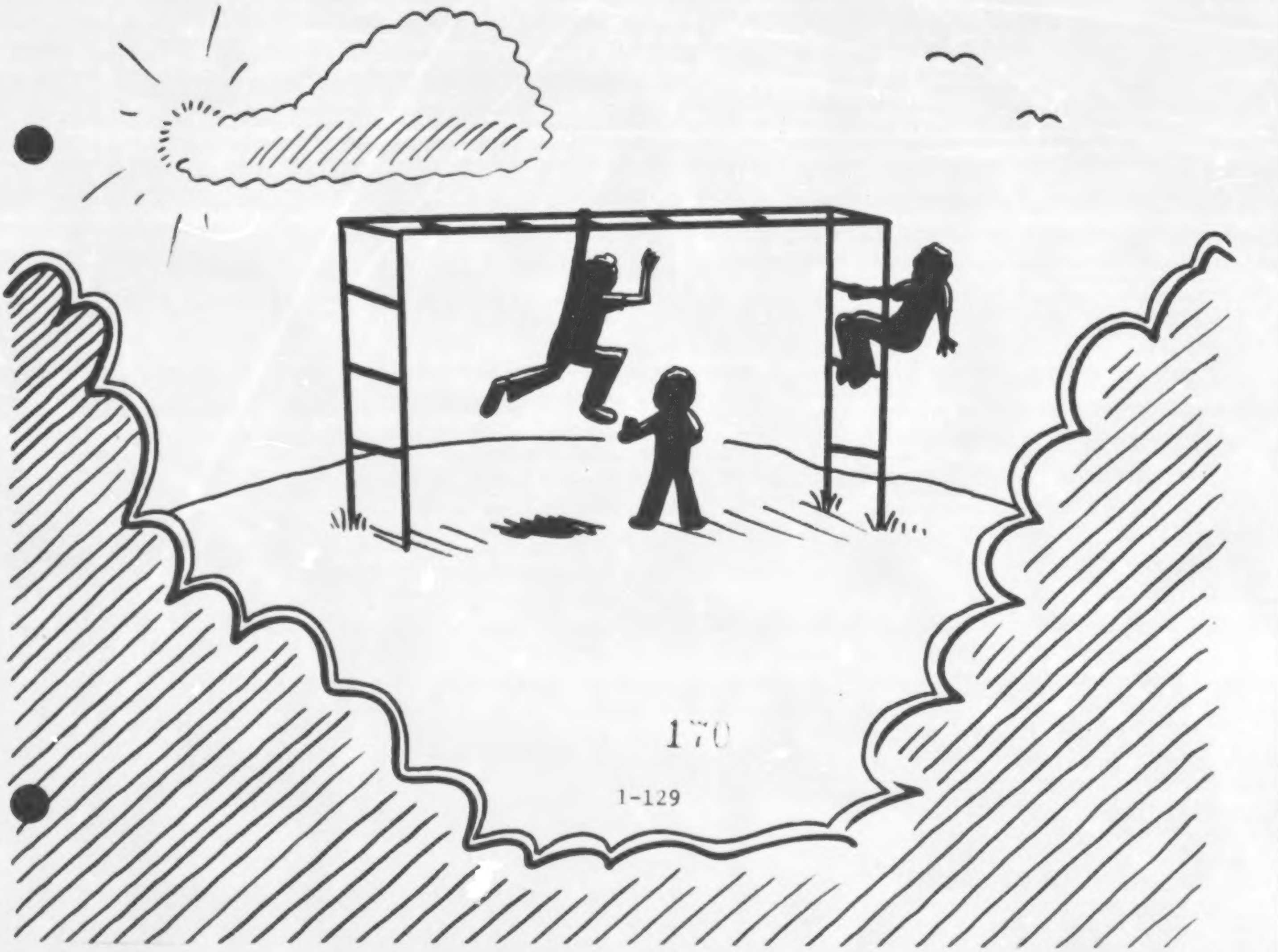
WHAT COULD HE DO? WELL, HE COULD LEAVE IT ON, BUT HE FELT HE SHOULD TURN IT OFF...

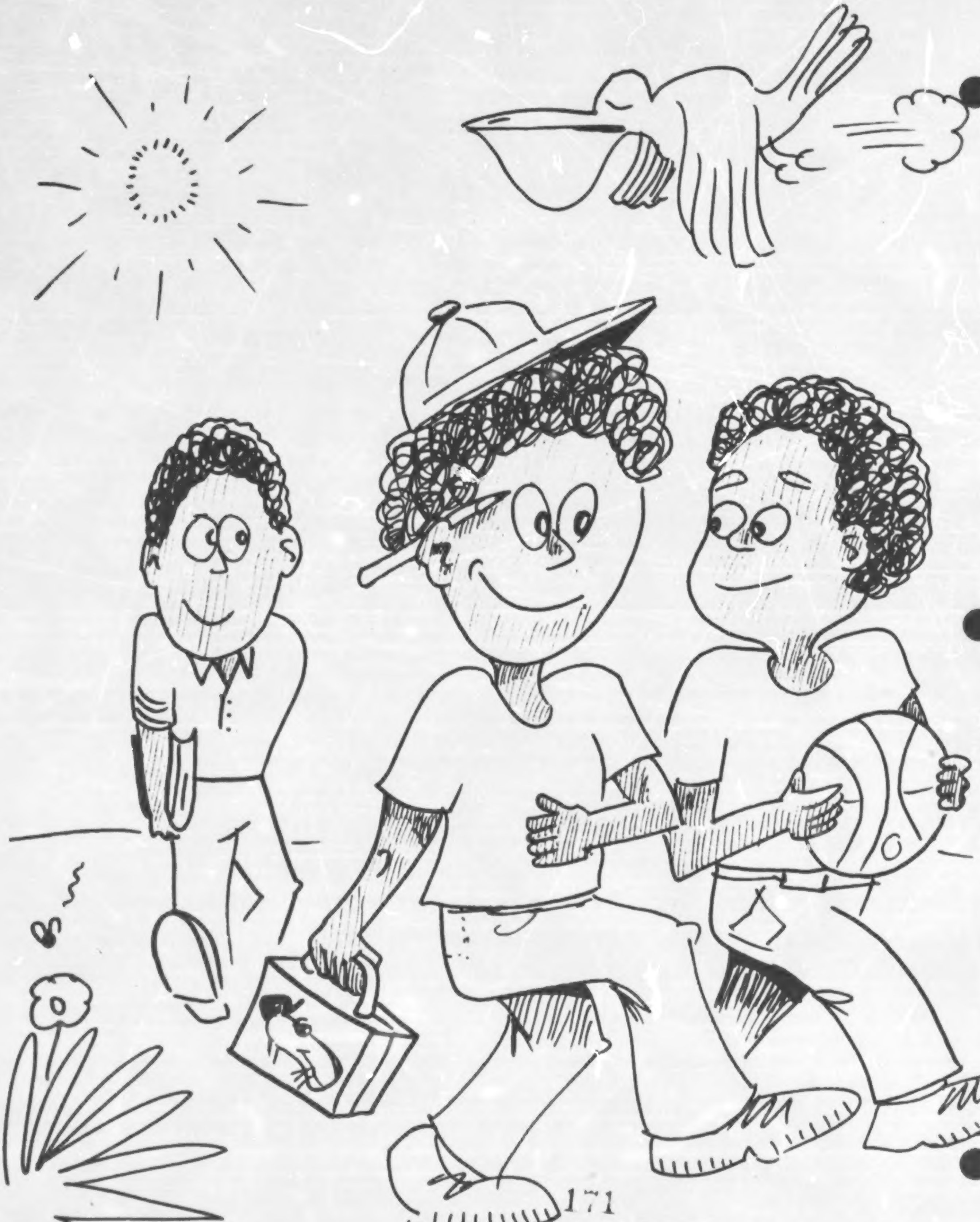


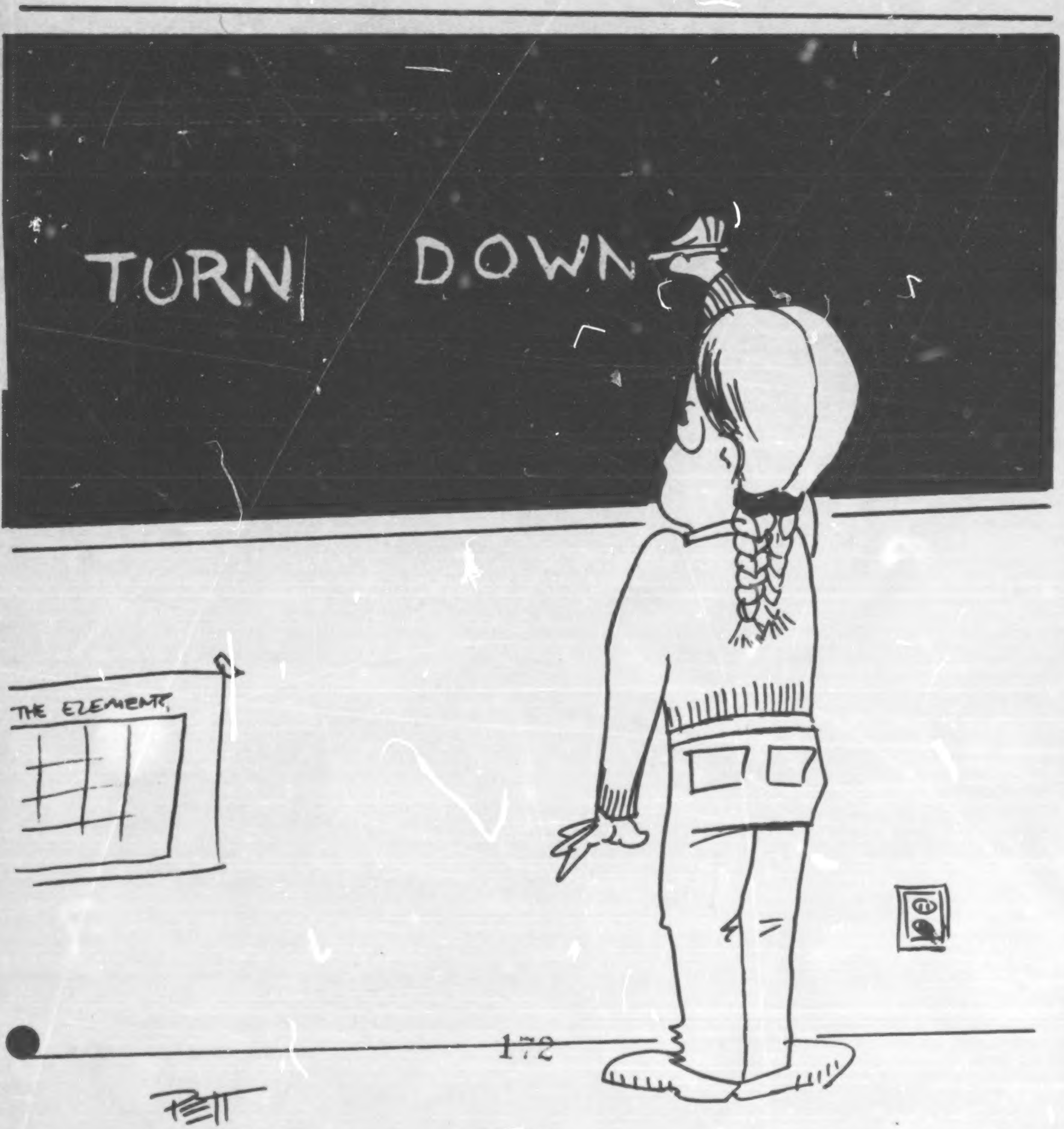
SO LEROY MADE A CHOICE – HE TURNED OFF THE TELEVISION.

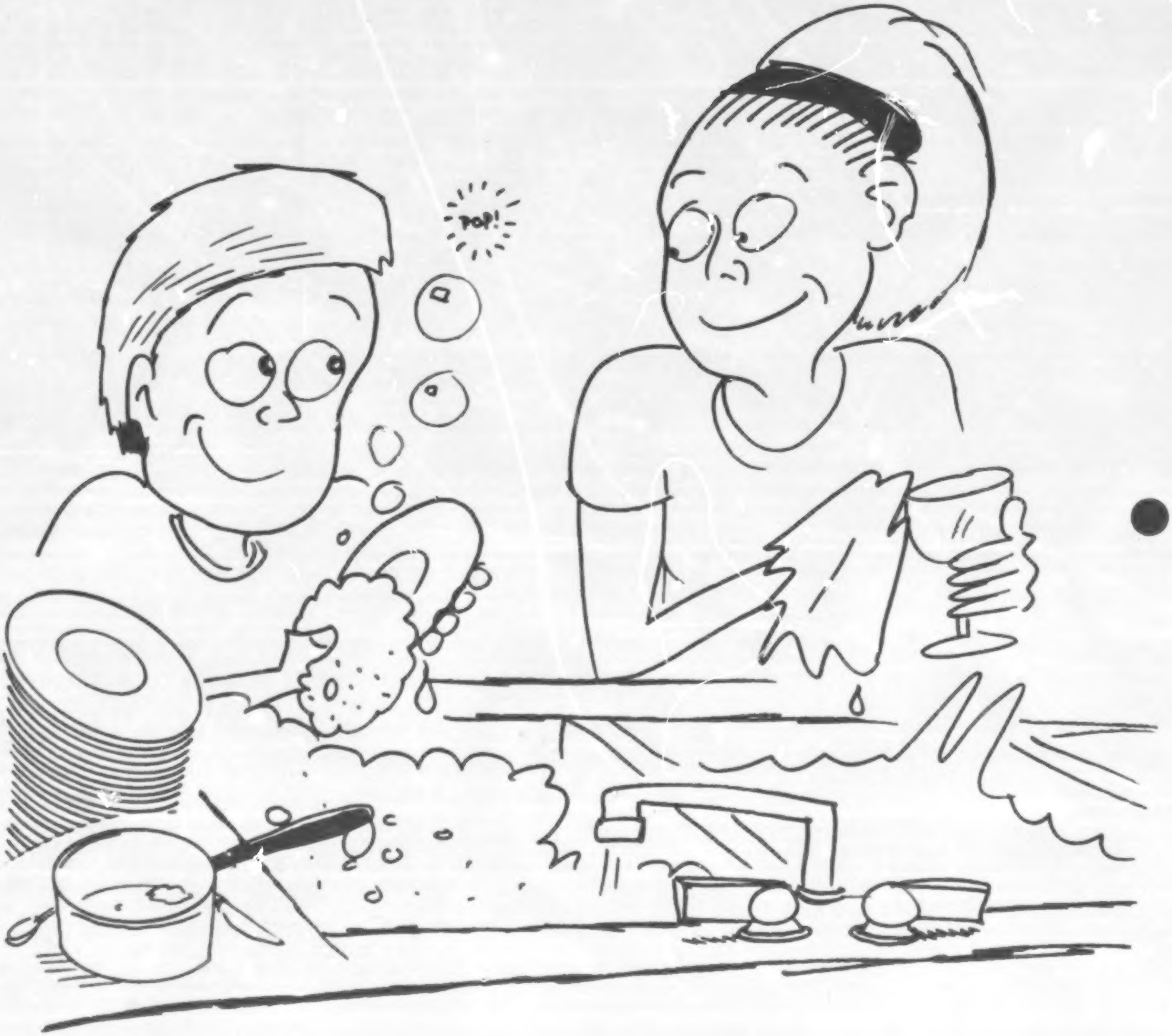

YIKES!!
70
CHANNEL
ON-OFF
BRIGHT
HORIZ.
VERT.

AND, HAVING CHOSEN NOT TO WATCH ANY MORE TELEVISION, HE WENT OUT TO PLAY.




PETT


TURN DOWN
THE ELEMENTS
PETT


POP!

LESSON 3-6: YOUR SOLUTIONS TO ENERGY PROBLEMS

Rationale

Students have learned about consumer roles they can take and how to make decisions. It is important to reinforce this learning with activity which integrates the aspects of their consumer role and decision making. This activity is designed to promote this goal. Hopefully, students will practice taking this role and also rate their consumer role as a high priority in their everyday lives.

Objectives

1. Students will rate their consumer role as a high priority in their everyday lives. Teachers can assess the achievement of this objective through activities in Part B of this lesson.

2. Students will practice skills in taking their consumer role in decision making. Teachers can assess the achievement of this objective by students' plans and activities in Parts C and D of this lesson.

Main Activity

A. Review with students the three dimensions of their consumer role and the important parts of decision-making. Talk with them about how they make decisions in each of the three roles of shopper, user, and disposer of energy products.

Create a situation for students where they have a problem of getting paints for their class or for their homes. Tell them that they need to buy paints, use them to paint pictures and then dispose of them. Talk with students about the variety of decisions that are involved in choosing what technique to use, when to use it, and how to dispose of it.

B. Now have students select a real situation that is important to them in their classroom or home. They might decide to do something about the paper they use, the crayons, the books, or the magazines in their classroom. They should talk about an actual situation where using energy products, shopping wisely, and disposal are to be improved. You may want students to work with you as a class on this activity or you may want them to work in small more independent groups with you.

C. When students have selected a situation which is important to them, you should discuss with them why it is important. They should see that taking an energy consumer role is a key part of their everyday lives and they should be able to talk about its importance in terms of their contribution to an important problem, the money they will save, and the energy that will last longer.

D. When students recognize the importance of the situation they have chosen, they should plan how they will solve the problem or make decisions. They should see that there are decisions involved in shopping, using, and disposing of the energy products that they have selected. You should discuss with them how they can make decisions about what to do about their particular energy problem. Students should use each step in the decision-making process that they have learned in this chapter.

E. You may want to bring individuals into the classroom in order to give students more information about the problem or problems they have selected. School officials, custodial staff, people from the community, or parents might serve as important resource people by finding out about what their energy problem is and whether their decisions make sense in terms of the restraints and opportunities afforded to them in their school or community.

F. Then have students carry out their decisions. They should work in groups or as a class to actually implement what they have decided needs to be done. As they are implementing the decision and when they finish, they should report back to the class about their progress. When the task is completed, you should discuss with students their solutions to energy problems using the following questions:

1. What problem did we try to solve? (e.g. turning off lights, saving paper)

2. Why was this problem important? (e.g. We will save money. We will save important energy.)

3. How did you use your role of shopper, user, and disposer of energy products? (e.g. We bought paints; we analyzed how the school bought paints; we used the energy product carefully; we have not disposed of it yet because we are still using it.)

4. What decisions did you make in this case? (e.g. a decision to work together to monitor our use of lights)

5. Do you think these decisions were good decisions? (Yes, because we could save energy, or no, because it was impossible to carry out.)

G. When students have completed their review of their solutions to their energy problem, they should find a mechanism for sharing that with others. You may want students to go to another class to share in their success; or you may ask students to go home and talk with their families about how they were successful in solving an energy problem. This is important reinforcement for students in terms of peer and/or adult congratulations on their success.

Grade Level Adaptation

2-3: You might want students to keep logs of their activities in carrying out their decision according to what language arts skills you are teaching. You may want them to post their logs around the room and to talk with students about different things they did in carrying out their activities.

4-6: You may want students to work in groups in different problems and to conduct a coordinated school-wide campaign regarding a particular source of energy.

Language Arts Adaptation

K-1: Have students develop some questions to ask the person that you bring in as a resource person for his or her energy problem.

2-3: Have students write a paragraph about why the energy problem they have selected is important.

4-6: Have students write news articles for their school or community paper describing what they did to save on the use of energy products and how successful they were.

Math Adaptation

K-1: Have students categorize people with whom they would like to share their solution to their energy problem. They might make one category of students, another of teachers, another of administrators, another of parents. Then have them count the number of people in each category with whom they think they should share their information.

2-3: Have students keep track of how long it takes them to carry out their activity. Telling time and counting hours and minutes and days can be taught through this vehicle.

4-6: Have students work with fractions in terms of what proportion of the people are sharing in their energy conservation activities. You should have the number of students in the school, and the number of teachers and administrators, so that students can describe who they think they reach through their activity and what fraction of the total population that is.

ASSESSMENT ACTIVITIES FOR CHAPTER THREE

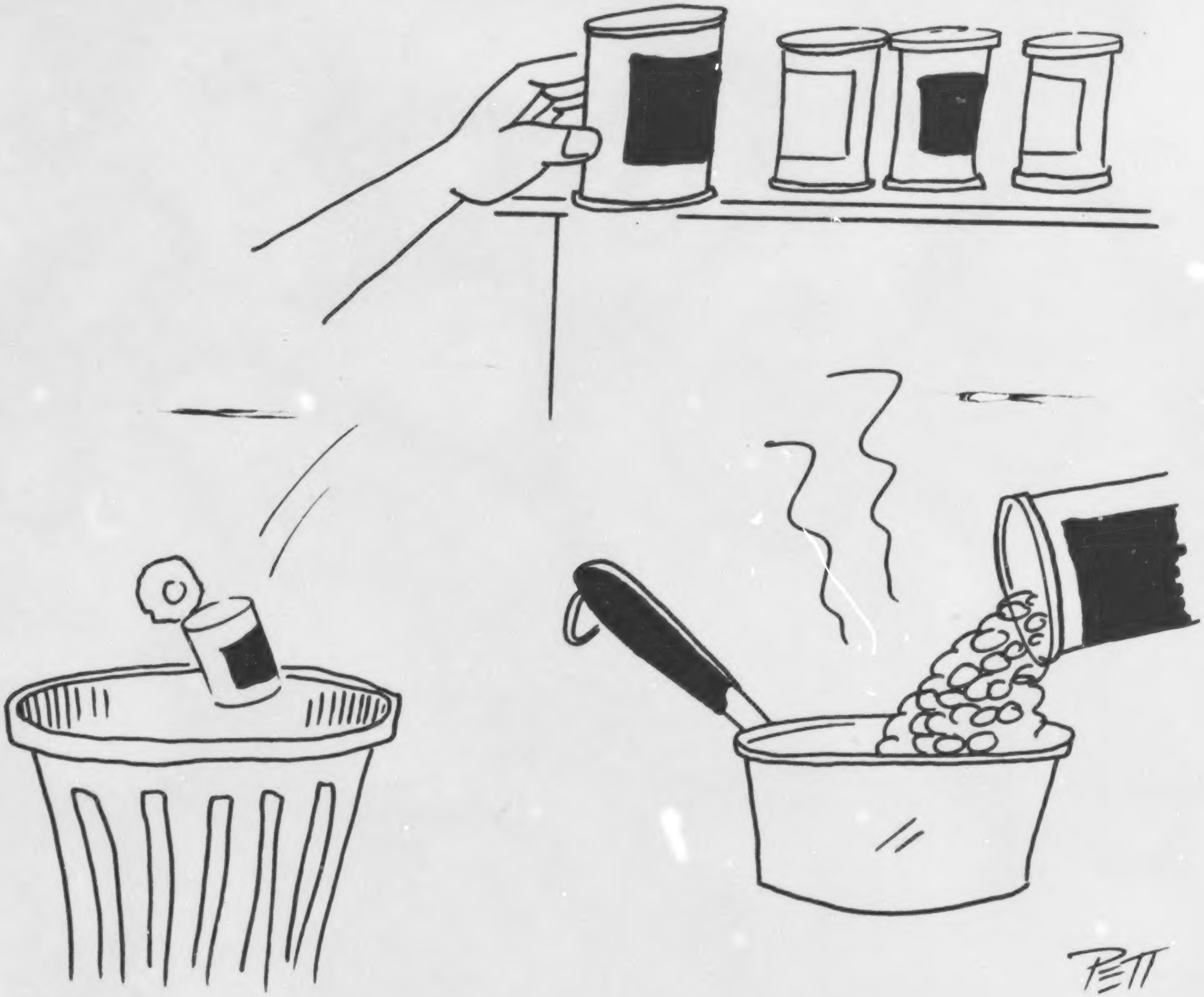
These assessment activities are designed to assess the students' understanding of the roles that they can take in the energy problem. They should be able to identify how they can take shopper, user, and disposer roles in problem solving about energy. The assessment also deals with decision-making skills that students have learned which are fundamental to their role as effective energy actors.

Assessment Activity One

This assessment activity features three pictures. One picture shows an energy shopper; another, an energy user; and the other, an energy disposer. Students should be able to pick out which of the pictures shows each of these different roles and should use their knowledge of shopping, using, and disposing of energy. They should be able to tell what energy product is involved, what role is involved, and how the person is performing that role.

Assessment Activity Two

The object of this assessment activity is for students to put the four pictures in order. They have been given a decision situation about the problem of heating. They should be able to put the decision-making steps in order according to the lesson. This will show that students need to know about a problem, need to determine different ways they can solve the problem, need to make a choice, and need to determine the outcomes.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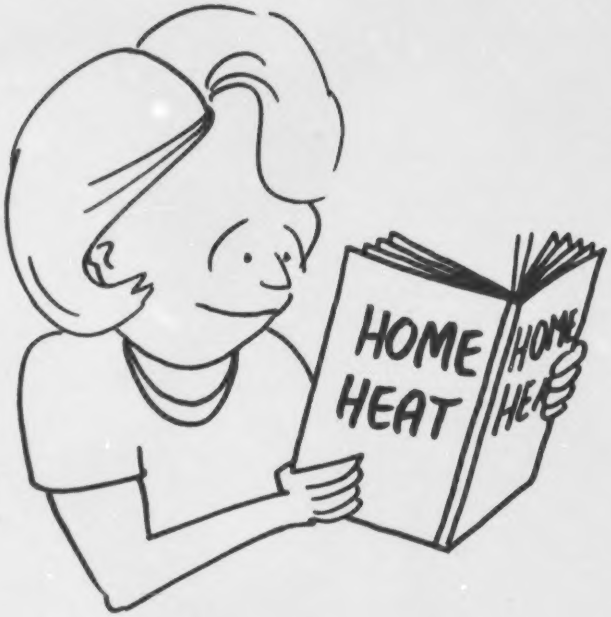
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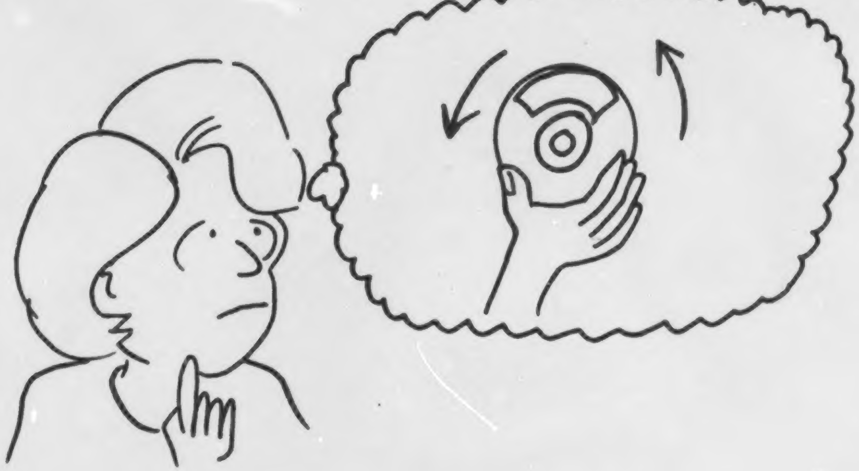

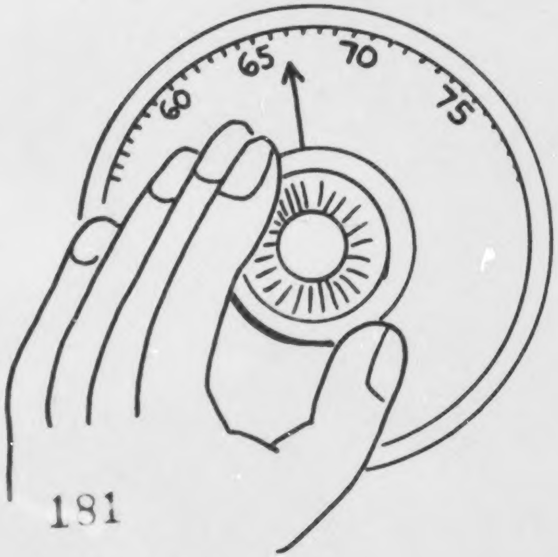
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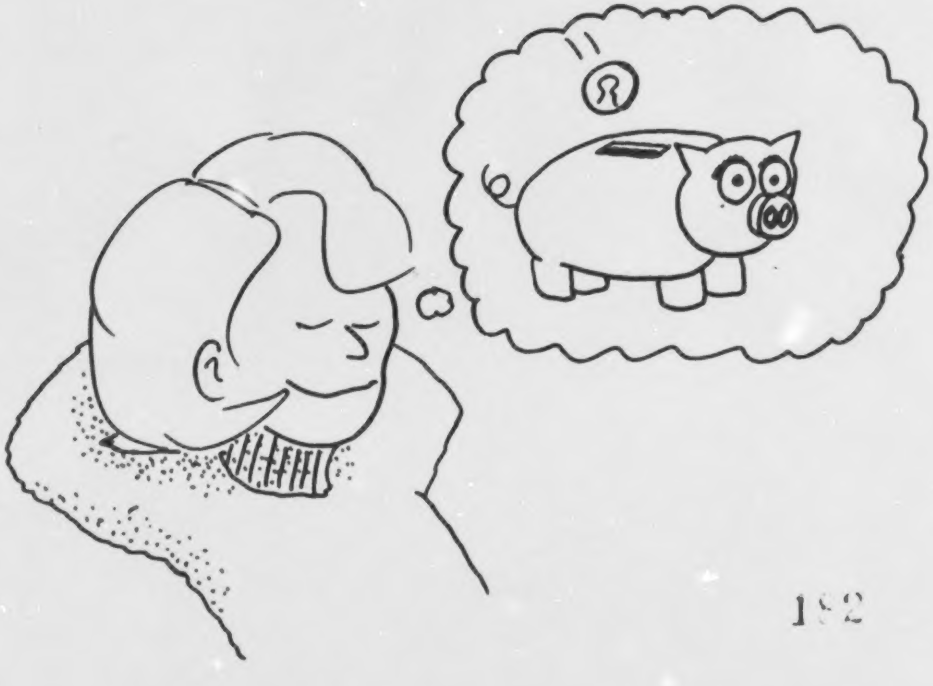


STUDENT ENERGY SURVEY

UNIT I

This survey of knowledge, skills, attitudes and participation habits can be used as a pretest, a posttest, or both. A student answer sheet is enclosed. This survey is designed to measure student growth, and includes the main ideas from the entire unit.

There are three parts to this survey. The first part assesses knowledge and skills, and the second part assesses attitudes about energy conservation. The third section focuses on habits of participation regarding energy conservation. Since two answer sheets are required, you may want to give Section I at one time and Sections II and III at another time.

Teacher Directions:

Section I: Knowledge and Skills

1. After passing out an answer sheet to each student, ask them to put their names on the back of the paper.
2. Tell students that this is an activity to see how much they know about energy and how they feel about energy.
3. Tell them that you are going to read a sentence and they should put an X over the sad face or happy face. They should mark the sad face if they want to mark "no". They should mark the happy face if they want to mark "yes". Demonstrate on the blackboard.
4. Work through the example with your students. Read the sentence, "Cars Use Energy". Check to see that each student has put an X on a happy or sad face.
5. Read and repeat each sentence. Make sure that each child is on the correct number. The correct answers for this section are next to the statement.

Section II and Section III: Attitudes & Participation

Repeat the above procedure for Section II and Section III. Students will need another answer sheet. Make sure they put an X on a sad face for "no" or an X on a happy face for "yes".

Section I: Knowledge & Skills

1. We use very little energy in our homes. no
2. I am an energy consumer. yes
3. Turning off the TV is one way to save energy. yes
4. A poor energy disposer writes on both sides of the paper. no
5. Each of us can help with energy problems. yes
6. Each of us has human energy. yes
7. There are many energy products in our classroom. yes
8. A good energy question is clear and related to the problem. yes
9. I get very little energy from eating. no
10. I use body power when I color with crayons yes

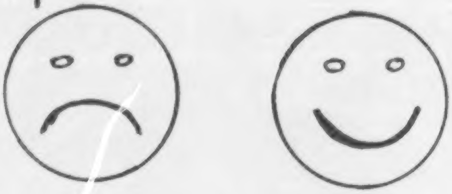
Section II: Attitudes

1. I can help solve energy problems.
2. It is OK to use lots of energy.
3. I should take care of my own energy.
4. I want to change the way I do things to save energy.
5. I want to learn more about saving energy.

Section III: Participation

1. I throw things away before they are used up.
2. I have asked a friend to save energy.
3. I waste energy in my home.
4. I use paper on both sides.
5. I turn the lights off in my home when I do not need them.

Example



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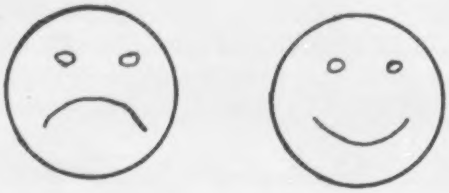

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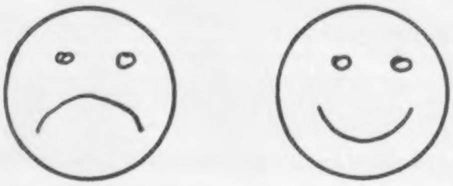

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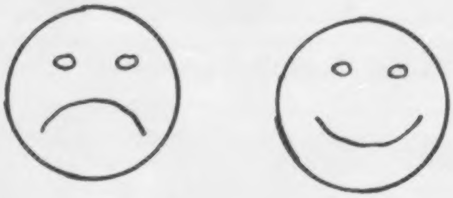

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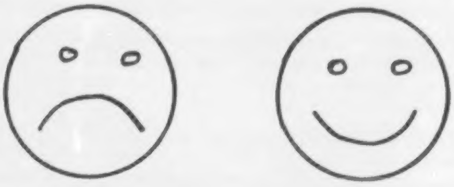

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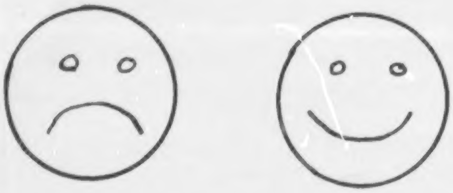

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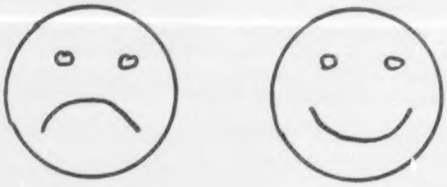

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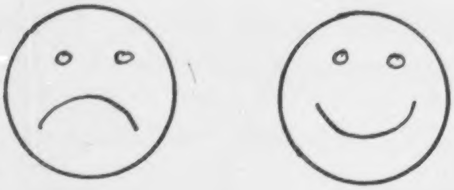

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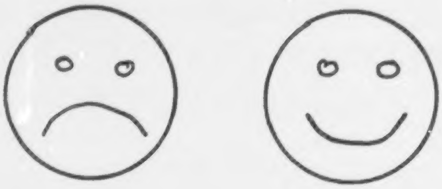

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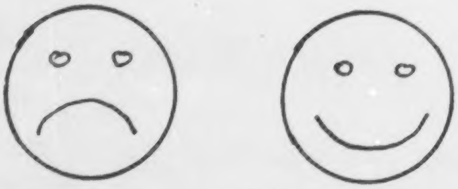

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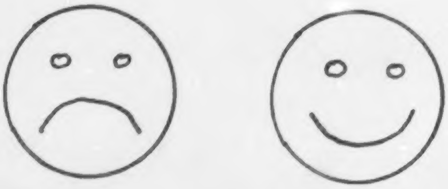


ADDITIONAL INSTRUCTIONAL MATERIALS

GRADES K-1

This is an annotated selection of energy education materials appropriate for the indicated grade level. To aid the teacher in making an astute selection the following criteria have been used: 1) usability in an instructional setting, 2) compatibility with Indiana's energy curriculum project, 3) emphasis on active student participation, 4) emphasis on the development of an energy conservation ethic, 5) relevance to the students' lives, and 6) accuracy and up-to-dateness of energy facts and trends.

Energy: A First Film. BFA Educational Media, 2211 Michigan Avenue, Santa Monica, California 90404. 8 minutes, sound, color. $15.00/rental.

> This film illustrates that most of our energy comes from the sun. Green plants use energy from the sun to produce materials that we find useful as foods.

Energy and Conservation Education: Activities for the Classroom. (Grades 1-3). Energy and Man's Environment. 0224 S.W. Hamilton, Suite 301, Portland, Oregon 97201. 1977. $25.00.

> This is a comprehensive multi-disciplinary publication in a looseleaf binder with many specific activities each organized around the headings of title, concept, objective, time, subject matter area, grade, implementation, and materials. Well done.

Energy Ant Filmstrip Set: Elementary Level. Federal Energy Administration. Available on loan from Energy Consultants, Division of Curriculum, Indiana Department of Public Instruction, 229 State House, Indianapolis, Indiana 46204. (For Indiana teachers). 72 frames, color.

> Two filmstrips, "What Is Energy" and "What Is Energy Conservation," done in cartoon style. Teaching guide with discussion questions, projects, and vocabulary included. Set comes with cassette tape.

The Energy We Use. (Grade 1). Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy. National Science Teachers Association. Available from U.S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830. 1977. 42 pp. No charge.

> One of a series of booklets produced by NSTA with lessons about energy sources. One lesson about conservation. Some pages can be duplicated.

Home Sweet Earth. Marie Meaney. Highline Public Schools, Seattle, Washington. Available through ERIC - ED 132 009.

Ten lessons on energy and energy sources designed to be used at grade 1. Each lesson includes main concept, notes to the teacher, procedure, evaluation activities and additional activities.

Learning About Energy. (Grades K-3). David C. Cook Publishing Company, School Products Division, Elgin, Illinois 60120. 1978. $4.50.

Twelve full-color photographs (10 3/4 X 13 3/4) that acquaints students with sources of energy, how it is produced, and how it may be conserved. Background information on the back of each card. 24 page teacher's manual included.

Learning, the Magazine for Creative Teaching. "Energy for Today and Tomorrow: Activity Posters." January, 1978. pg. 48. Order poster only from Starting Points, Dept. 3705, P.O. Box 818, Maple Plain, Minnesota 55348. $2.00.

This poster has a game board for a simple energy conservation game that requires no reading skills.

Iowa Energy Conservation Activities Packet. (Grades K-2). Iowa Energy Policy Council, 215 East Seventh Street, Des Moines, Iowa 50319. 56 pp. $2.00.

This is a binder which includes notes to teachers and student materials which are particularly well done. This unit includes a large fold-out poster and a fold-out game board to be used with the activities.

Spin! Toot! Scoot! Martin Mayer Productions, 900 Federal Avenue, Seattle, Washington 98102. 14 minutes, color. 1970. $195.00/purchase.

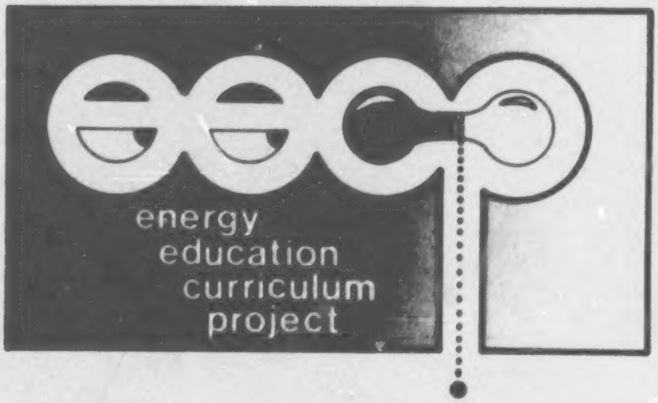
This film focuses on how various forms of energy make toys move. It complements the unit in this packet on home energy products. It is worth checking your film library to see if they have this selection.

Tilly's Catch-A-Sunbeam Coloring Book. Solar Service Corporation. 306 Cranford Road, Cherry Hill, New Jersey 08003. 32 pp. $1.50 pre-paid.

A step-by-step coloring book which shows the basic concepts of solar heating.

Unit II: Energy and Your Community

An Energy Curriculum for the Elementary Grades


eecp
energy
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project

Lt. Gov. Robert D. Orr, Director
Indiana Department of Commerce
Harold H. Negley, Superintendent
Indiana Department of Public Instruction

UNIT II: ENERGY AND YOUR COMMUNITY

Rationale

This unit is the second in a series of three units for energy education in the elementary grades. "Energy and Your Community" is designed for use with grades two and three. Two key ideas were introduced in the previous unit "Energy and You". They are human energy and energy products. Human energy is defined as physical or body energy. Energy products are defined as that which is made from an energy source and made by using an energy source. If you wish to review these ideas turn to Chapter 1, Lesson 1-1 and Chapter 2, Lesson 2-1.

This unit aims to develop students' knowledge about patterns of energy use in their community. We are interested in expanding their awareness beyond their own personal boundaries so that they may see themselves as part of a larger community. In this context they will see how their own decisions and actions affect the community as a whole.

The first chapter introduces students to energy use in their community. They will look at various sectors of the community that use energy, such as neighborhoods, businesses, service organizations and government agencies. Students will be taught the skills of evidence-gathering and energy conservation. They will then engage in a project involving their own actions in taking care of community energy.

The second chapter is designed to teach students about how energy products are used. They will gain knowledge of the three major patterns of energy use: wasting energy, conserving energy, and using alternative forms. They will learn to value the conservation of energy sources. They will then study their own patterns of energy use in order to be able to change these patterns into more optimal ones.

The third chapter focuses on energy habits per se. Students will learn how their own personal habits of energy use make a difference because these habits, when combined with the similar habits of others, create larger patterns of energy consumption. They will then be taught the skills and given the opportunity to change their personal energy habits and also to influence the energy habits of others in their community. In this way they will see that they can effect a change in the energy distribution pattern as a whole.

Objectives

Chapter 1

1. Students will become aware of places and people that use energy in their community (Lesson One).
2. Students will be aware of the energy they use in their homes and in their neighborhoods (Lesson Two).
3. Students will be aware of the human and non-human energy that is used by businesses in their community (Lesson Three).
4. Students will know how various service organizations in their community use energy (Lesson Four).
5. Students will learn the skill of gathering evidence (Lesson Four).
6. Students will become aware of the way governments use energy and how government laws affect energy problems (Lesson Five).
7. Students will rate saving energy in their community as a high priority in their lives (Lesson Six).
8. Students will know how to take care of energy in specific ways in their community (Lesson Six).

Chapter 2

1. Students will become aware of a variety of uses of energy in their school, homes, and community (Lesson One).
2. Students will acquire knowledge about how human energy is wasted and conserved, and how alternatives are used in their own everyday lives and in their community (Lesson Two and Three).
3. Students will acquire knowledge about energy sources, products, and their uses. (Lesson Three).
4. Students will see energy conservation as a high priority in their everyday lives (Lesson Four and Five).
5. Students will apply their knowledge of energy waste to their own everyday lives (Lesson Four)

6. Students will apply their knowledge about energy conservation to their school, family, and community (Lesson Five).

7. Students will practice their consumer roles in trying to convince others that energy conservation is important (Lesson Six).

Chapter 3

1. Students will become aware of their own habits of energy use (Lesson One).

2. Students will become aware of their own good and bad habits as energy consumers (Lesson Two).

3. Students will learn how they can act to change their energy habits (Lesson Two).

4. Students will become aware of groups that practice energy-consumer habits (Lesson Three).

5. Students will learn how they can change energy habits in groups (Lesson Three).

6. Students will apply their knowledge of energy habits and ways to change them to situations in their home and school (Lesson Four).

7. Students will apply their knowledge of energy habits in their community and how to change them to actual groups and settings (Lesson Five).

8. Student will show concern for changing energy habits (Lesson Six).

9. Students will practice evidence-gathering and decision-making skills in changing energy habits (Lesson Six).

CHAPTER ONE: ENERGY IN YOUR COMMUNITY

Rationale

This chapter is intended to introduce students to energy sources in their community. They should become aware that energy is used in various sectors of their community, including neighborhoods, businesses, service organizations, and government. They should also gain some knowledge about basic human energy and energy products that are used in their community every day.

As students move through the lessons on various sectors in their community, they will also engage in activities in taking care of community energy. They will meet with people in their community or have people come into their school in order to talk about possible ways that energy can be saved in their community.

Finally, students will engage in a project which involves their own action in taking care of community energy. They will translate their knowledge and ideas into something that they can actually do.

Objectives

1. Students will become aware of places and people that use energy in their community (Lesson One).
2. Students will be aware of the energy they use in their homes and in their neighborhoods (Lesson Two).
3. Students will be aware of the human and non-human energy that is used by businesses in their community (Lesson Three).
4. Students will be aware of the energy products that are produced and used by businesses in their community.
5. Students will know how various service organizations in their community use energy (Lesson Four).
6. Students will learn the skill of gathering evidence (Lesson Four).
7. Students will become aware of the way governments use energy and how government laws affect energy problems (Lesson Five).
8. Students will rate saving energy in their community as a high priority in their lives (Lesson Six).
9. Students will know how to take care of energy in specific ways in their own community (Lesson Six).

LESSON 1-1: COMMUNITY ENERGY

Rationale

Students have learned in Unit I about energy at home and in their school. Here they will begin a study of energy in their community. They will see how using human and environmental energy is an important part of community life. The purpose here is to create awareness about various places and people who are energy consumers in the communities where students live. This lesson is a beginning. Students will study various parts of their community and how energy is used in depth in later chapters.

Objective

Students will become aware of places and people that use energy in their community. Assessment of this objective can be made by students' responses to the general summary questions and Activity H of this lesson.

Main Activity

A. Bring a map of the community where students live to class or have the class design a map. Ask students to locate their school on the map. Mark the place for them. Also have them locate generally where they live, or where they go to church, or where they eat at a local restaurant. Show them that the map outlines the places that are contained within their community. Normally, communities have names. Even if you are part of a central city, you have a familiar section which defines your community. Show students the boundaries of the particular community in which they live. Ask them for ideas about what buildings are part of their community and what people are part of their community as you have drawn it.

B. Use the pictures that are enclosed with this lesson (Pictures 1-1 through 1-5) to help students explore the idea of community. Tell them that a community is a city or a town, or a part of a city where people live and act together in doing things. Tell them that the pictures show them parts of the community that are important parts of their everyday lives. Discuss with them what buildings are shown in the pictures, what people are shown in the pictures, and how they contribute to the community.

Picture 1-1: School. There are probably several schools in your community. You might want to point them out on the map that you have found of your community. Students should see that schools involve people such as students, teachers, principals, and parents from the community acting together.

They work together in order to help students learn things that are important to them in their everyday lives.

Picture 1-2: Family. Families are very important parts of communities. There are probably many families in your community. If students have located where they live on the map, they can see how many families comprise the community. Families work together in order to contribute to the community. They live there, often work together, and often play together, as part of community life.

Picture 1-3: Recreation Center. Recreation centers are also important parts of communities. Locate some nearby centers on your map. They involve students, parents, and other community members in social activities, sports events, and community meetings. In many cases recreation centers have been at the heart of community life.

Picture 1-4: Factory. People also work in communities. Many people work in factories; others work in small businesses. These places are the support for the community. Most people live in a particular community because its near their work. They may also work outside of the community itself. Locate some factories and businesses on your map.

Picture 1-5: Government. All communities have governments. Governments make laws which people must obey. Without a government, community life would be very disorganized. Locate city/town hall on your map.

C. Ask students to color any of the pictures 1-1 through 1-5. Talk with them individually about what they are coloring, and how those places and people contribute to the life of their community.

or

Have students bring in their own pictures about places and people in their community, and then make a collage which represents how their community is seen by students.

D. Explain to students that every community uses energy much like their homes use energy and their schools use energy. Their whole community uses a lot more energy.

Explain to students that people are the main energy users in any community. People make choices about what they will do. Every time they decide to drive a car, for example, they decide to use energy. One chief way people use energy is in driving cars. People drive cars many places: to work, to school, to a baseball game. Cars use gasoline. Gasoline is a very scarce energy source. A second main way people use energy is in their homes. Homes are a major energy consumer because heat and lights are important to living at home. Have students find some major thoroughfares in their community and where homes are concentrated in their community.

Put the words "community energy" on the board or on big sheets of paper, and list under it "people drive cars" and "people live in homes" as major users of energy. Have students give examples of how people use energy by driving cars and by living in homes that use energy.

E. Now talk with students about a study that they can do as a class. Indicate to them that cars are major consumers of energy in communities. They can study the use of gasoline energy by finding out some things about how their family, relatives or friends use their cars. Indicate to students that they need to find out one thing which will contribute to the study. They need to determine for any one day (or the weekend, time between the time school ends and the time class begins the next day, or two days, etc.) the following thing:

> How many miles did their family, relatives, or friends drive using their cars?

Students will bring the mileage figures to class. You need to do some calculations in order to make these figures meaningful to them. You should do the calculations. Students should not do this. The purpose of the activity is to show students how miles relate to dollars. It is not the purpose here to teach students the calculations. In order to prepare for the class activity, use the following figures for calculating the cost of driving a car.

A. Miles driven = 100 (hypothetical)
B. Miles per gallon = 18 (national or current local average)
C. Gallons used = 5.5 gallons (divide A. by B. or 100 by 18)
D. Cost of gasoline = $.70/gallon (national or current local average)
E. Total cost = $3.85 (multiply C. by D.)

The formula for computing total cost can be stated as follows:

A. ÷ B. = C.
C. x D. = E.

You can use the averages for number B and D or you can use actual figures from your community.

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F. Work with students to determine how much gasoline the class uses during the time period that you have selected. Tell students you are going to do a study in gasoline use by cars belonging to families, relatives, or friends in your classroom. Then put two phrases on the blackboard. The first phrase should be "number of miles." The second phrase should be "total cost." Now have each student report to you how many miles their family, relatives or friends drove their cars. These should be put together in a list that can be added by you or by the students for a total. Put the total under the phrase "number of miles." Students should see that the class as a whole used the cars a lot more than any one student.

Now tell students that gasoline is used up according to how many miles are driven. Tell them gasoline costs a lot of money. Now calculate the cost of gasoline used by the students according to the previous formula. It is not necessary for students to do this calculation. Write the total on the board under the phrase "total cost." Students should be amazed. Now conduct a class discussion using the following questions.

1. How many miles did the class as a whole use the car?
2. What was the total cost of the gasoline energy that was used by the class?
3. What would happen if we drove many fewer miles in cars? (You might suggest half the amount under the phrase "number of miles" or 100 less miles, etc.) (Answer: The cost would be much less and we would save energy. You might want to calculate the savings by subtracting the number of saved miles in number one and follow the formula.)
4. In what ways might we save on the gasoline energy that we use? (e.g. Walk instead of ride; use the car together instead of individually.)

G. Ask students who else uses gasoline in their community (e.g. people who drive buses or trucks, motorcyclists, boaters, farmers on tractors). Go back to your map and help students to identify the major places in which gasoline energy is used (highways, farms). Have someone who drives a lot (e.g. the school bus driver) come in and talk with students about how important gasoline is to his or her job. Focus on ways that gasoline is used, ways it might be saved, and what would happen if there were no gasoline.

H. Summarize what the students have done in terms of community energy. Ask them what they know about large energy consumers in their community. They should quickly tell you that cars and homes are major energy consumers. Then have students think about ways that they might save energy. Have them try out one of these ways for one week as part of a class project. Ask students during that week how they are making progress and why they think that saving energy is important.

Grade Level Adaptation

K-1: Use the pictures in the lesson to indicate to students where energy is used and who uses energy in their community. Use examples of your own car or your own house to help students to see how important cars and homes are in energy use in communities. Discuss with students how they think they could save on energy use. List their responses on the board.

4-6: Have students gather articles on places in their community that use energy. They can do a lengthy study of their own family cars and homes in terms of energy consumption. You may want someone from a public utility to come in to talk to the students.

Language Arts Adaptation

K-1: Have students act out how they would use energy in the places shown in the pictures with this lesson.

2-3: Have students pick out examples of energy use in the community from a book they are reading.

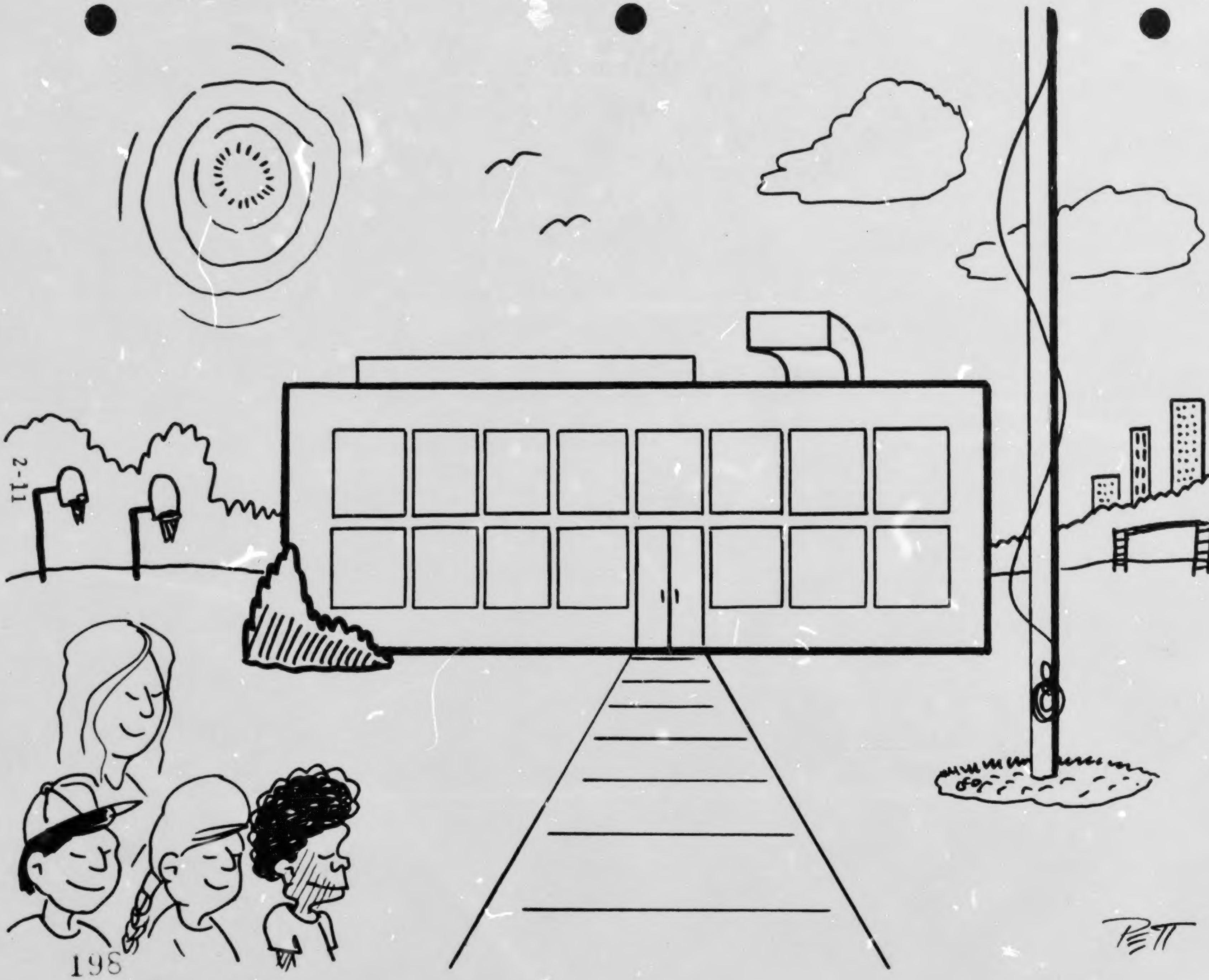
4-6: Have students write a story about the energy use of a particular person, group, or building in their community.

Math Adaptation

K-1: Have students compare the energy use of two people that you tell them about. Make these people drive cars differently and use heat differently in their homes. They should be able to tell which of the two people uses more or less energy.

2-3: You may want students to add all the types of places and people who use energy that are represented in the pictures with this lesson.

4-6: Have students work more with gasoline and mileage to teach them any basic math functions that you are now using in the classroom.



LESSON 1-1: PICTURE 1-1

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LESSON 1-1: PICTURE 1-2

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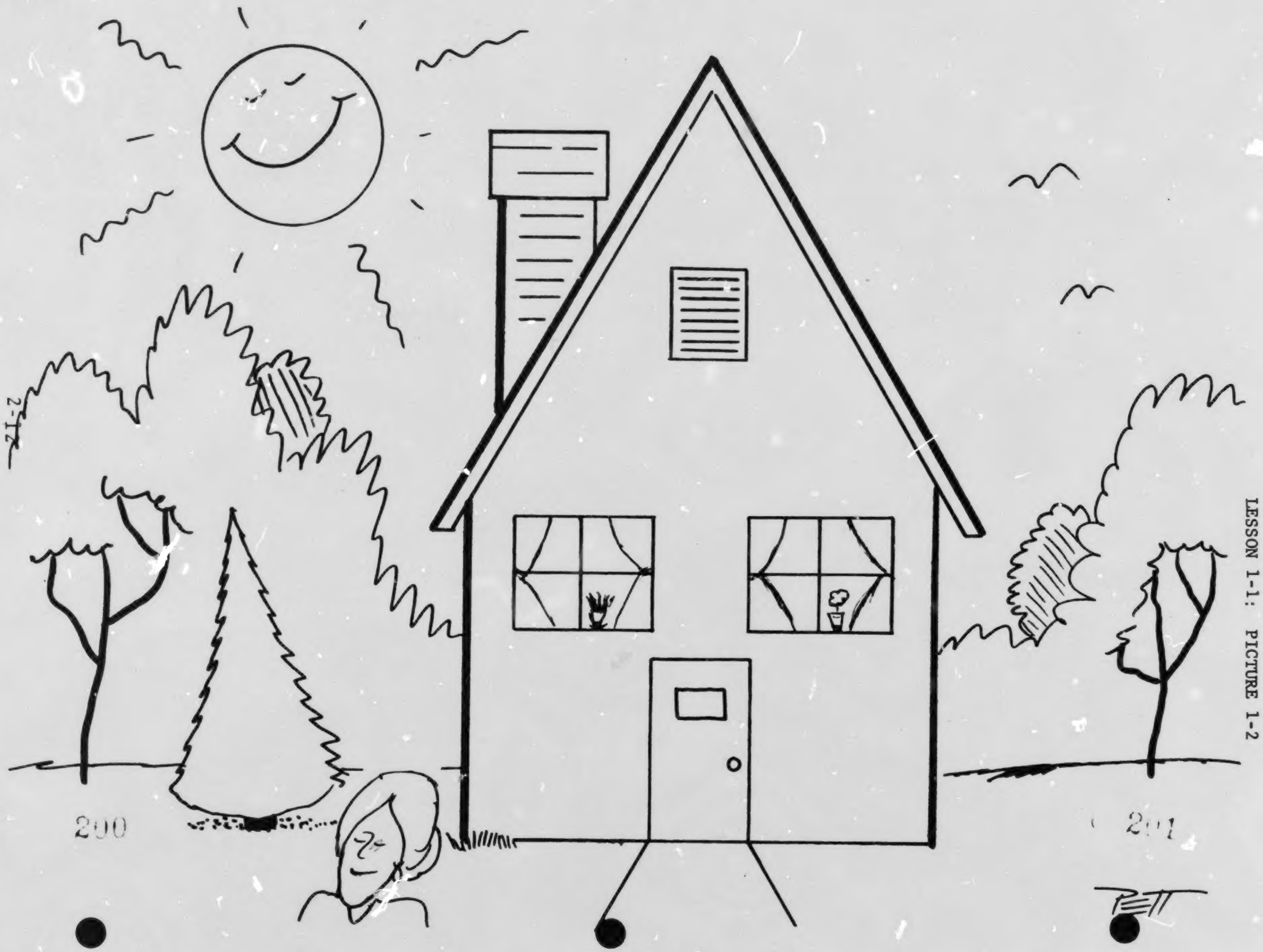

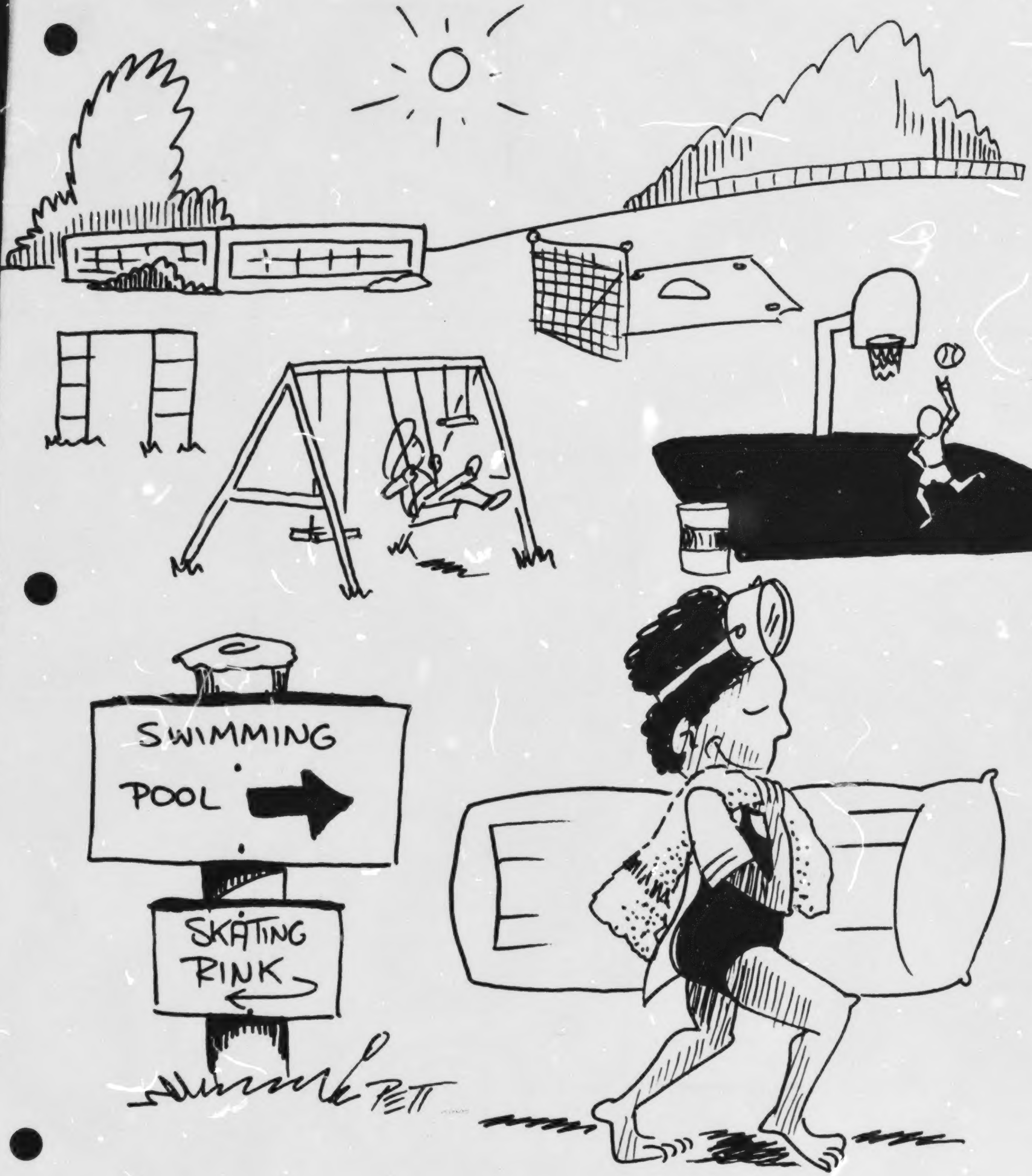
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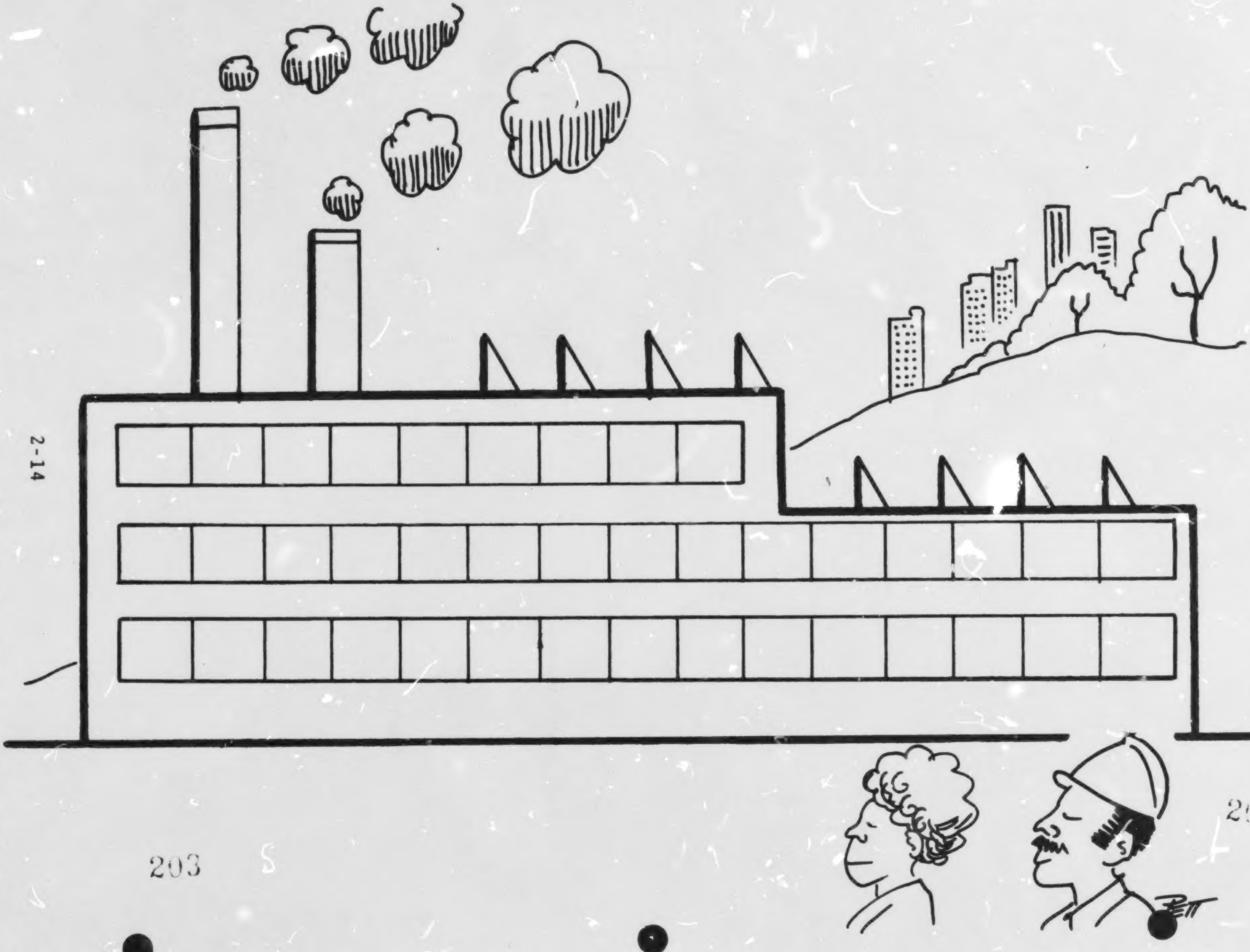
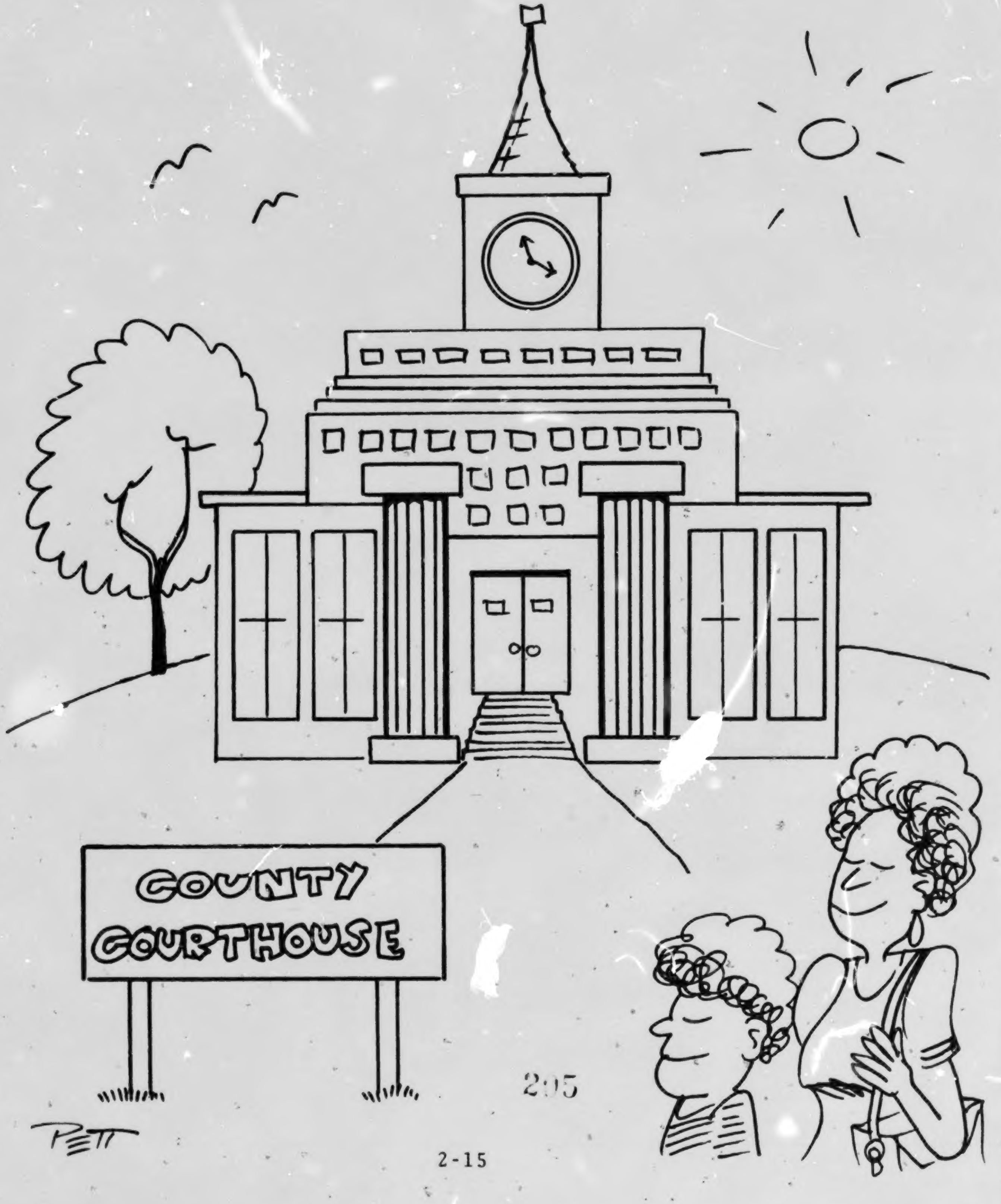


LESSON 1-1: PICTURE 1-4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LESSON 1-2: FAMILIES AND NEIGHBORS

Rationale

Families are an important part of any community. Households are also major energy consumers. Therefore, in this lesson, we will begin our exploration of the community use of energy with a study of households in the student's neighborhood.

In this lesson students will explore their neighborhoods in terms of home heating and the use of electricity. They will attempt to read electrical meters and to determine how many kilowatt hours of energy they use in an average day. The main objective here is not for them to be able to read the meter, although this would be very helpful. It is for them to realize exactly how much energy is used in homes across the country.

Objective

Students will be aware of the energy they use in their homes and in their neighborhoods. Teachers can assess student attainment of this objective by the discussion that is held in Activity G of this lesson and by utilizing Assessment Activity I at the end of this chapter.

Main Activity

A. Talk with students about the idea of a "neighborhood." Put the word "neighbor" on the blackboard. Have students identify who they think their neighbors are. They might be people who live in apartments near theirs, people who live at homes on the same block, or people who live on farms quite a distance from the student's farm. Talk about the idea of neighbor and the idea of neighborhood and how a neighborhood is a group of people who live near each other. Here students should see that there are neighborhoods all across their community and that a single community may have thousands of neighborhoods.

B. Help students to draw a map of their own homes and their neighborhoods. They should not worry about the boundaries of what they consider their neighborhood to be. It should be defined by the people who live around them. Their own conception of who lives around them is what should guide their pictures. They should then take the map home and work with their parents or other members of their families and help them to fill in the names of their neighbors that can be placed on the map.

When students return with their maps and the names of their neighbors, you should talk with them about their maps and how families or neighbors use a lot of energy. Home heating and the use of electricity in homes is one of the major sources of energy use. Therefore, like all other people, people in their neighborhoods are some of the major consumers of energy.

C. Then talk with students about the variety of ways that families and neighbors use energy. They should remember what they have learned about the family's uses of energy in previous chapters. They should talk about ways in which their neighbors use energy in the same way or differently than their families do.

Then ask students to talk with one of the people they have defined as a neighbor and ask that person how he or she uses energy. They should write down the various ways that the neighbor talks about using energy and bring that information to class.

D. Discuss with students the wide variety of ways their neighbors use energy. Then talk with students about how home heating and lighting are one of the chief uses of energy by families. Talk with them about the fact that homes, whether they are apartments or houses or farms, are heated in a variety of ways. They can be heated by using electricity, by using gas, or by using oil. Some homes of students in the class may even be heated by coal. Ask students to go home and determine how their own homes are heated. They may ask their parents or others in their families or buildings (for those who live in apartments) what form of home heating is used. Probably the answers will be either electricity, gas, oil, or coal.

E. Home heating is a complex concept. It is complex because people heat from a variety of sources. They also measure the heat in a variety of ways. Students should see that the use of electricity, for example, is different. Some people use it for heating, almost everyone uses it for lights, some people use it for stoves. In an average apartment building, for example, the air conditioning may be electric, the heat may be oil, and the appliances, such as the stove, may be gas. Therefore, the students may have as many as three or four meters measuring the different amounts of energy use. All of the electricity is ultimately measured in terms of kilowatt hours. A kilowatt is a unit of power equal to 1,000 watts. Actually, a kilowatt hour is a unit of energy equivalent to that transferred in one hour by one kilowatt of power. This is a way of measuring energy uses. When students read an electrical meter, it will always be in terms of kilowatt hours.

Put the word "kilowatt" on the board and talk with students about how electricity is measured in thousands of watts in the same way a light bulb can have a certain wattage. You might want to bring in 2 different sized light bulbs to show the students how different wattage gives different amounts of light. In the same way, electricity is measured in terms of thousands of these wattages because there is so much electricity used in a home.

Now talk with students about how they can measure the amount of electricity they use in their homes. Tell them that they may use it for heating or only for lights or for some other form of energy use. They should first find out in what ways electricity is used in their homes. The normal categories will be that it is used for heating, that it is used for lighting, or that it is used for electrical appliances.

Now tell students that they are to find out two things. First, they are to find out what things use electricity where they live. Then they are to find out how much electricity is used by reading the electric meter which shows energy use in terms of kilowatt hours, or the number of watts of electricity that are used in an hour in their homes.

The pictures enclosed with this lesson are designed to help you teach students how to read an electrical meter. It is a simple process. It involves following a set of criteria. They can be listed below:

1. The lowest number is always recorded in reading a meter. Therefore, if the meter rests between two numbers, the lowest number is that that is recorded.

2. Meters are read alternately from right to left and left to right. Therefore, the first dial on the meter on the far right-hand side is always read to the right. The second dial is read to the left. The third dial is read to the right. The fourth dial is read to the left. The fifth dial is read to the right, and so on. Some students may have three, four, or five dials on their electrical meters.

3. A different number can be read from a meter in any given hour, day, or week. They run continuously and the numbers are continuously changing.

Now work with students on the first line of the first picture enclosed with this lesson to read the electrical meter that is pictured there. The final number they should get is 25,037 kilowatt hours. They should read the first meter clockwise, or to the right. The number is between 7 and 8. Therefore, the lowest number is taken and 7 is recorded in the first space. The second dial should be read to the left. Therefore, it should be read counterclockwise. The dial is between 3 and 4. In this case, 3 is the lowest number because we are reading to the left. 3 should be recorded in this space. Now ask students how the third dial should be read. It is read to the right and 0 is the lowest number. The fourth dial should be read to the left. It is directly on 5 and therefore 5 should be recorded. On the last dial, the same holds true, and a 2 should be recorded.

Now use the second line of the first picture to show students how the same meter can be read at a later point in time and help them fill in the spaces. The second picture of the meter reads 29,438 kilowatt hours. Students should get the correct number from reading the meter.

Then you should help the students subtract one number from the other. They should see that there were 4,401 kilowatt hours of electrical energy used in this household during the time between the first reading and the second reading. This is the amount of energy that they used.

You should find out the cost of energy in terms of kilowatt hours in your community and help students to multiply to determine the cost of electricity that has been used on these meters.

F. Now have students go home and find the answers to the two questions. They should find out (1) what uses electricity in their homes and (2) how much electricity is used at a time that you specify during the day. You might want to specify a time between 5:00 and 7:00 in the evening when most students will be home. Ask students to have their parents or their friends help them to read the meter if they wish. They should use the first line of the second picture enclosed with this lesson to draw where the dials are on the meter when they read it, to put in the time when the meter was read, and to write down the reading of the meter.

When students have read their meters, you should discuss with them what their meter readings mean. You should use the blackboard or a big sheet of paper to write down all of the meter readings that students have determined. Talk with students about how this is the first point at which they can see how much electricity is used in their living unit.

G. Now have students go home and read their meters again, using the second line of the second picture in this lesson. They should read it at the same time of the day the next day or the day after, depending upon what you want to do, and draw in the dials and the amount of electricity used.

When students have completed this task and brought their numbers back to class, they should be placed in the second column on the paper or blackborad which you have saved from the first day. Then hold a discussion with the students utilizing the following questions:

1. What uses electricity in our homes? (e.g. heating, cooling, lighting, etc.)
2. How much energy did we use? (Subtract the numbers in the first column from those in the second and get the totals. You might want to do individual totals or class totals.)
3. How much did the electricity that we used in our homes cost? (Multiply the individual or class total for electrical usage times the amount that a single unit of energy costs.)
4. What can we do to save energy? (e.g. turn down the thermostat, use fewer lights, use the stove less often)
5. Why is it important to save this energy? (e.g. We will save quite a bit of money -- you might want to illustrate this for students -- and we will also save energy.)

H. Ask students to identify a kindly understanding neighbor whom they know well. Now have students take a copy of the third picture in this unit and talk with this neighbor about his or her use of energy. The student should explain how to read the meter if the neighbor doesn't know how. They should read the meter with the neighbor on two consecutive days. When students have completed this task, talk with students about what they did and how much energy the neighbor used compared to what they used and whether or not they can help the neighbor to save on the use of electricity.

Grade Level Adaptation

K-1: After you explain to students the concept of "neighbor" you might want them to compare their own use of electricity with what they know about their neighbor's use of electricity. You might want to give them some numbers so that they can see how some neighbors will use more energy than others. It is not necessary for them to calculate the kilowatt hours, but just to determine whether more or less energy is used by things like the number of lights that are used, or where the thermostat is normally set.

4-6: Students may design a survey that covers part or all of the neighborhood. They may offer the service of reading meters for a select number of their neighbors and then compile the results of their survey, comparing their own electrical usage to those of their neighbors and those of other neighborhoods of students in the class.

Language Arts Adaptation

K-1: Help the students to design two good questions that they might ask their families or their neighbors about their use of electrical energy.

2-3: Have students develop a diorama of their neighborhood and various ways in which electrical energy is used.

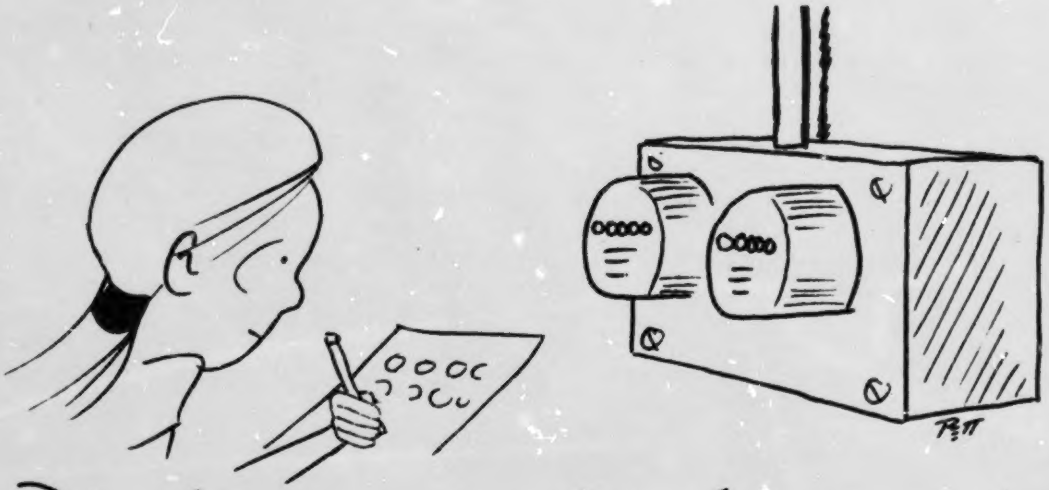
4-6: Have students design a survey using language arts and question-asking skills that they have learned.

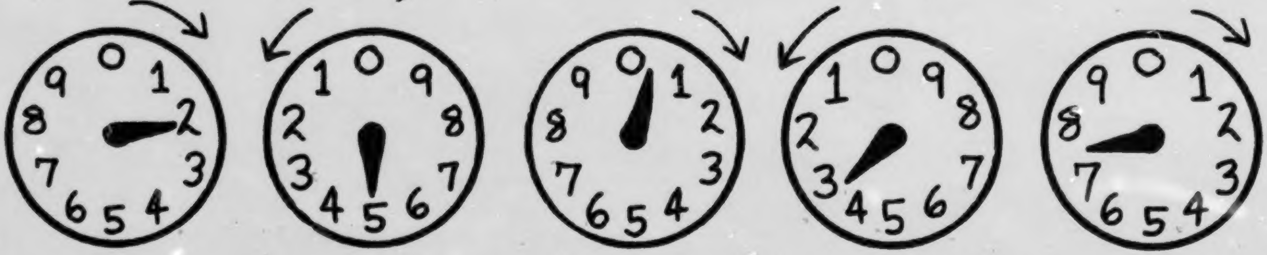
Math Adaptation

K-1: Have students compare two descriptions of different neighborhoods that you develop. Talk with them about the differences in energy use in the two neighborhoods in terms of which neighborhood uses more or less energy.

2-3: Explain to students the idea of a kilowatt hour and have them compute a variety of usages of kilowatt hours by subtracting one figure from another. They can practice a great many subtraction skills using this method.

4-6: Have students do graphs or charts of electrical usage in various neighborhoods. They can practice compiling data and tables using this idea.





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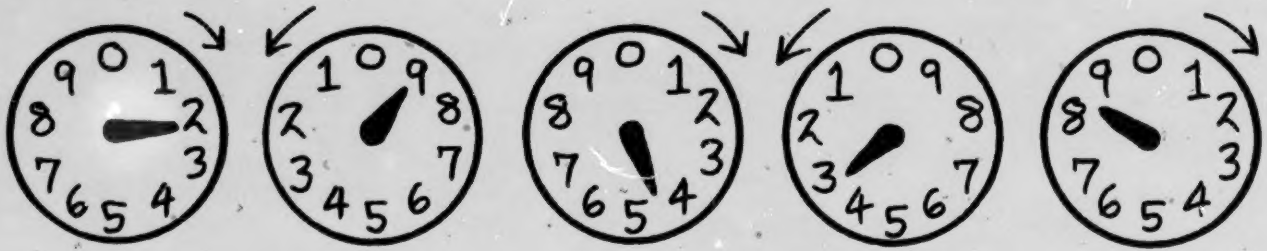

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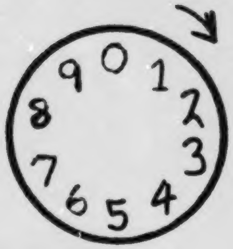
LESSON 1-2; PICTURE 1-2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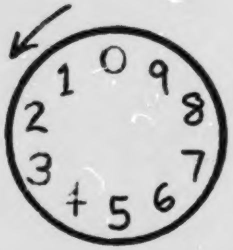
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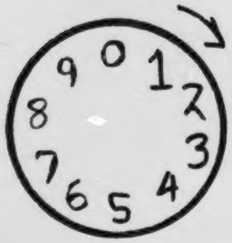
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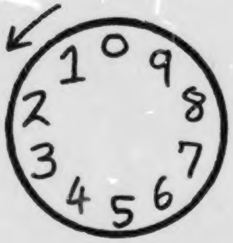
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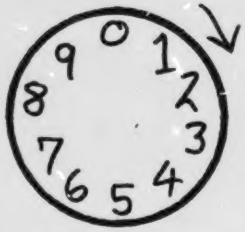
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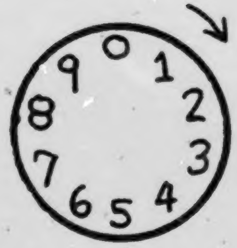
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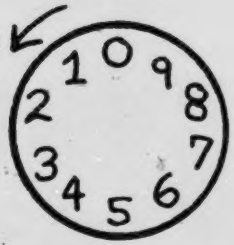
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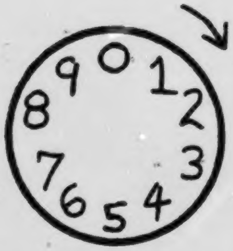
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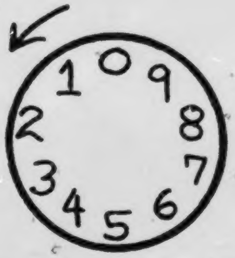
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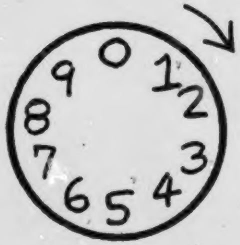
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LESSON 1-3: PEOPLE AT WORK

Rationale

Small and large businesses are the cornerstones of communities. They all use energy in important ways. In many ways, businesses produce energy products and sell those products as well as use them. Therefore, they impact on the energy problem in a variety of ways.

Here students will become aware of businesses in their community and how they use energy. They will also work with several businesses in helping to take care of the energy they use and produce.

Objectives

1. Students will be aware of the human and non-human energy that is used by businesses in their community. Teachers can assess the achievement of this objective by students' responses to Activity F in this lesson or by Assessment Activity 1.

2. Students will be aware of the energy products that are produced by businesses in their community. Teachers can assess the achievement of this objective by students' responses to Activity F in this lesson or by Assessment Activity 1.

Main Activity

A. Talk with students about what the word "business" means. Begin the discussion by talking about places where people in their families work. Their relatives, fathers, mothers, sisters, or brothers may work somewhere. Hold an open-ended class discussion on the variety of types of work that students know. Put the word "business" on the board. Ask students to give examples of business from those places they they mentioned in their discussion. Ask them if any of the places they have mentioned are not businesses. Then talk with students about how a business is an organization whose purposes is to make money by providing goods and services.

B. Help students to map various businesses that they have mentioned in their community. Students should be able to see three or four different types of businesses and how they work. Then have students draw their own pictures of the business where someone they know works. Have them color the pictures and talk about how this is a business and who works there.

C. Now lead a discussion with students about how businesses use both human and non-human energy and how energy products are produced and used. People who work in businesses are often tired when they come home at night. There may be people in the students' families who they can say are tired from working in a business. They use their human energy at work and this affects their thoughts and feelings. In addition, the business, like a home or a school, uses energy for lights, heat, machinery, etc. Finally, the business also often produces energy products. Most factories in your community will product one type of energy product or another. Make sure that students clearly understand that businesses use energy, produce energy products, and employ people (therefore using human energy).

Ask students to go home and talk with someone in their family about energy use in the business where they work. Have them ask the person about both human and non-human energy that is used in his or her business.

D. Then talk with students about the uses of human and non-human energy that are made by businesses in which people in their families work. Indicate to them that non-human energy is important to almost all businesses. Some of the most important sources of energy are called "fossil fuels." Put the words "fossil fuels" on the board. Explain to students that fossil fuels are those sources of energy that come from below the surface of the earth. They are made by dried plant and animal matter that is many, many years old. Explain to students that the chief fossil fuels that are used in the United States are coal, oil, and gas. You may want to bring some of these objects in for students to see them. The importance here is for students to see that coal, oil, and gas are important fossil fuels that are used by businesses every day.

Then talk with students about how coal, oil, and gas are monitored by utility companies in every community across the United States. People pay for the use of these energy sources. The utility company in your town is normally the one that monitors the use of these energy sources. We can tell a lot about the use of energy by businesses in a community by talking with people in a utility company. Have students develop a series of good questions that they would like to ask someone from a utility company about how businesses use energy.

E. Now have the students visit one of the utility companies in their town or have someone from a utility company come in to talk with the students in a class. Have the students ask the questions that they have designed. Be sure that the person who comes in or with whom they talk at the company indicates which businesses in town use the most energy in terms of the three fossil fuels of coal, oil and gas.

F. Arrange for a visitor to come into the class or for students to visit a business which has been named by the utility company as a major consumer of energy in your community. Whether or not the visitor comes in or the students go to the business, they should develop a set of questions to ask the people who represent the business. They should talk about the human and non-human energy resources that are used by the business, what energy products are used or produced by the business, and how they try to save energy.

When students have completed their visit, or the visitor has left, you should help the students summarize what they have learned in this lesson by guiding the following discussion:

1. What human energy is used in business in our community? (e.g. People use human energy to run machines and to manage businesses; people work in grocery stores and other places where they must use human energy. They also use their heads to think about what they do and and many times they show anger or love, sadness or happiness in their work.)

2. What non-human energy sources are used by businesses in our community? (e.g. coal, oil, gas)

3. What non-human energy is used by businesses in our community? (e.g. heat, lights)

4. What energy products are produced by businesses in our community? (e.g. groceries, clothes, refrigerators, etc.)

5. In what ways are businesses in our community trying to save energy? (e.g. They are using fewer lights in advertising, they are heating or cooling at more desirable temperatures.)

G. Talk with students about ways they think they could work with people in business in order to save energy. Have them think about people in their family or friends who work in businesses who could help them. As students are carrying out their activity and when it is completed, talk with them about how businesses use energy and what energy they have tried to save. Ask them to work with the people they identify to try to help the businesses save energy. They may wish to think about the problem and write a letter to a person in a business or work with the person directly.

Grade Level Adaptation

K-1: You may want to bring in pictures of various types of energy that are consumed by businesses. You may also want to bring in pictures of the businesses themselves.
4-6: You may want students to do research on specific fossil fuels and have them give reports on the use of coal, oil, and natural gas in businesses across the United States. You may also want them to form a committee to work with particular businesses in trying to save energy.

Language Arts Adaptation

K-1: Students should draw pictures of businesses in their community and talk with the class about how the business that they have drawn uses both human energy and non-human energy.
2-3: Help students to develop a story about businesses and how they use energy.
4-6: Have students do a report either as individuals or as groups on various businesses in their community and how they use energy.

Math Adaptation

K-1: Give students a list of energy sources and energy products that are used by businesses. You may want to use pictures rather than writing the list. Then have students sort the pictures into categories of energy resources and energy products.
2-3: Give students a set of figures on energy consumption by businesses. Have students work with those figures in adding and subtracting energy use.
4-6: Have students create tables of the amount of energy and the type of energy that are used by businesses in their community.

LESSON 1-4: PEOPLE WHO HELP OTHERS

Rationale

Students have learned about how their neighborhood, businesses and factories use energy in their community. Here they will learn how people who serve others also use energy. They will learn about how people who belong to the police force, the fire department, hospitals, and youth organizations also use energy.

The lesson will focus on people in service groups in the community. It will also acquaint students with the skill of gathering evidence. It is important for them to know how to get information about energy use if they are going to be effective energy actors themselves. They certainly need to be able to back up what they say when they talk about saving energy. This lesson is designed to introduce this skill in the context of learning about community service organizations that use energy.

Objectives

1. Students will know how various service organizations in their community use energy. Assessment of this objective can be obtained by students' responses to the summary discussion in Activity H of this lesson or by Assessment Activity 1-4 at the end of this chapter.
2. Students will learn the skill of gathering evidence. Assessment of this skill can be tested by students' presentations of their study of one service organization in Activity I of this lesson.

Main Activity

A. Explain to students that there are people in their community who serve others. They try to help others out. Often, there are organizations that are designed to help people to lead better lives. Ask students if they can think of any service organization in their community. You may start the discussion by giving them some suggestions, such as the way their hospitals help people who are sick. Take the students' suggestions and write them on the board underneath the title, "People who help others."

B. Use Pictures 4-1 through 4-3 to help students explore the idea of community service organizations and their use of energy. The idea here is for students to see who is represented in the picture, how these people help others, and how these people use energy every day.

Picture 4-1: Fire and Police. The fireman and policeman in this picture help the community by putting out fires and by enforcing the law. Without them, community life would be very disorganized. They also use energy in various ways. Fireman certainly use water to put out fires, as policemen use cars in order to patrol roads.

Picture 4-2: Youth Organizations. The Cub Scouts and Brownie Scouts are youth organizations where students get together and carry out a variety of activities. They often help the community. For example, they have clean-up campaigns or recycling campaigns where students try to practice energy conservation. In cities, the YMCA and YWCA serve much the same function in almost any community. Youth service organizations help youth to do constructive activities which better community life. All of these activities use energy in some way.

Picture 4-3: Hospitals and Clinics. Hospitals and clinics are an important part of the community. They help people who are sick get well. They use heat and light. They also use gasoline for ambulances.

C. Have students color the pictures of various aspects of the community where service is done. Have them draw in any uses of energy that they can think of which are not represented in the pictures.

or

Have students gather their own pictures or draw pictures of service organizations that are using energy from their local newspaper, from their home, or from organizations with which they are affiliated. Have them describe the pictures in class in terms of what the organization is, what it does for the community, and how it uses energy.

D. Select one of the above groups -- hospitals or youth groups or the police or fire department -- and review with students the ways in which these groups use energy. Talk with students about how when you need information about energy, you need to find that information. In order to find information you need to use sources. Sources of information can be people, books, magazines, or the television, or lots of other sources. In terms of the group you have chosen, ask students to use one source in order to help them find out more about energy use for this group.

E. You should gather information sources representing a variety of types of sources in class. Students should bring their sources to class and report on what sources they use. You should conduct a class discussion of the energy use of a particular group and the source students have found, based on the following questions:

1. What do you know now that you did not know about energy use by this group?

2. What else would you like to know about energy use by this group?

3. What questions might you ask someone who would come into the class about energy use by their group?

F. Bring in someone from the group that students have investigated to talk about energy use by this group. Have students ask that person their questions, and use that person as a source for information. Remind students that people can be very valuable sources for finding out about energy use.

G. Then ask students to talk with their parents about a particular community service group and the way it uses energy. Tell them to use their parents as a source for information and to come back to class to talk about what their parents say. In class, discuss with students how much more information they have about energy use as a result of using their parents as a source of information.

H. Summarize what students have learned about service organizations. In addition to organizations in the pictures, be sure to include day care centers, garbage services, etc. Help students to make a list of community service groups on the board. Have students name the organization, list how the organization helps the community, and how that organization uses energy. Then talk with students about why we need community service organizations and the various ways in which they can be sources of information about energy use.

I. Have students find out about one service organization to which they belong or someone in their family belongs. Have them list the sources they use to find out about this organization. Have them make a short oral talk about what the organization does, how it uses energy, and what sources of information they used to find out about that organization.

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Grade Level Adaptation

K-1: You may want to use different pictures with this lesson. There should be pictures of service occupations in a book that students have in the classroom. You may also want to bring in a set of sources of information, and bring in persons who can relate to K-1 students how they use energy in their service occupations (i.e. safety patrol, school nurse, etc.)

4-6: Students can bring in their own pictures or news articles about service organizations that are using energy. They can do group projects to find out about what these groups do, how they use energy, and how they might save energy. Students can do interviews, use primary sources, and secondary sources in the library.

Language Arts Adaptation

K-1: Have students use a tape recorder and describe a person or a service organization with which they are familiar and the energy that this organization uses.

2-3: Have students find one source of information about energy use. Have them give the name of this source and state why it has helped them to find out more information about energy use.

4-6: Have students use the library to write a report on one service organization.

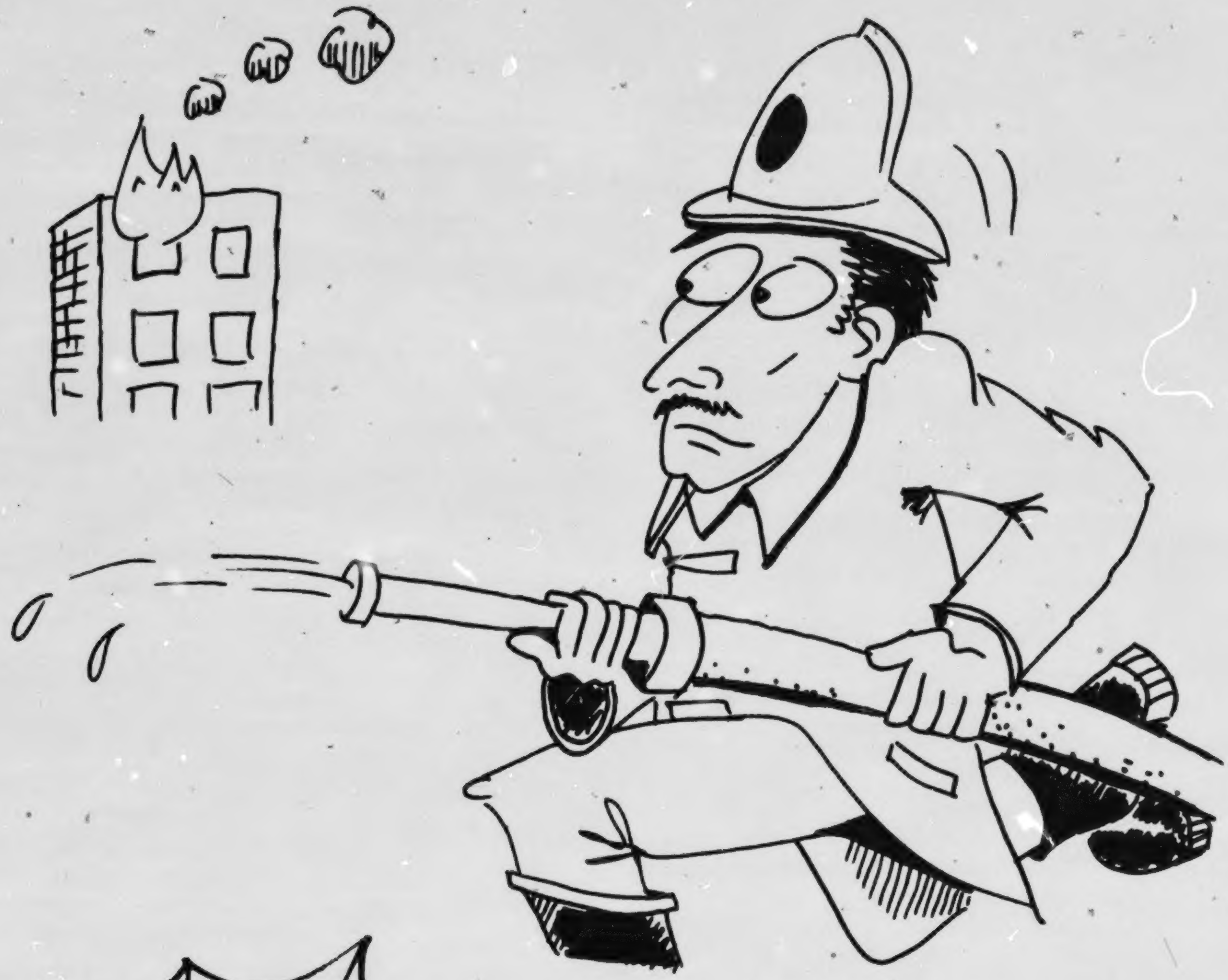
Math Adaptation

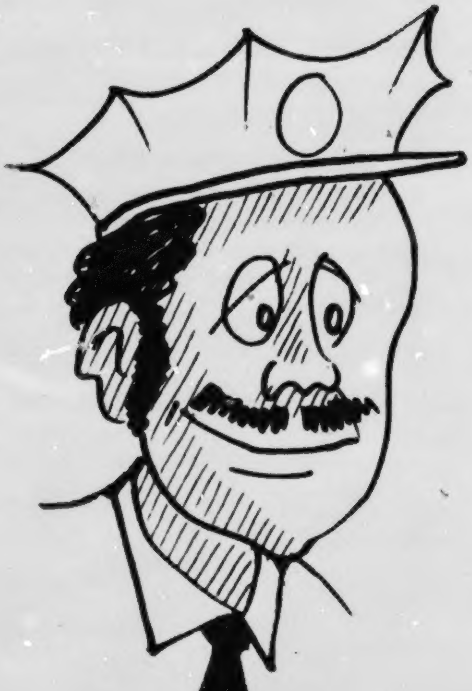
K-1: Have students count the number of service organizations they see on their way to school. Have them count them on the way home. See if they can find more organizations on their way home than they did on their way to school. Gather a variety of pictures of community service organizations which students can sort into groups representing fire and police, youth organizations and hospitals.

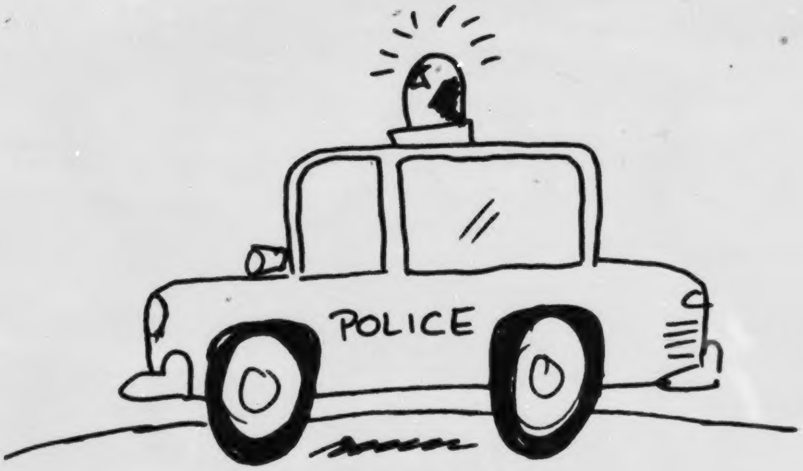
2-3: Have students study newspaper headlines in their local paper to see how many of the headlines deal with service organizations. Have them describe how these service organizations use energy.

4-6: Have students use a telephone book to list the number of service organizations that are in their community. Have them add or subtract, multiply or divide the number of service agencies, depending upon what math functions you are teaching.

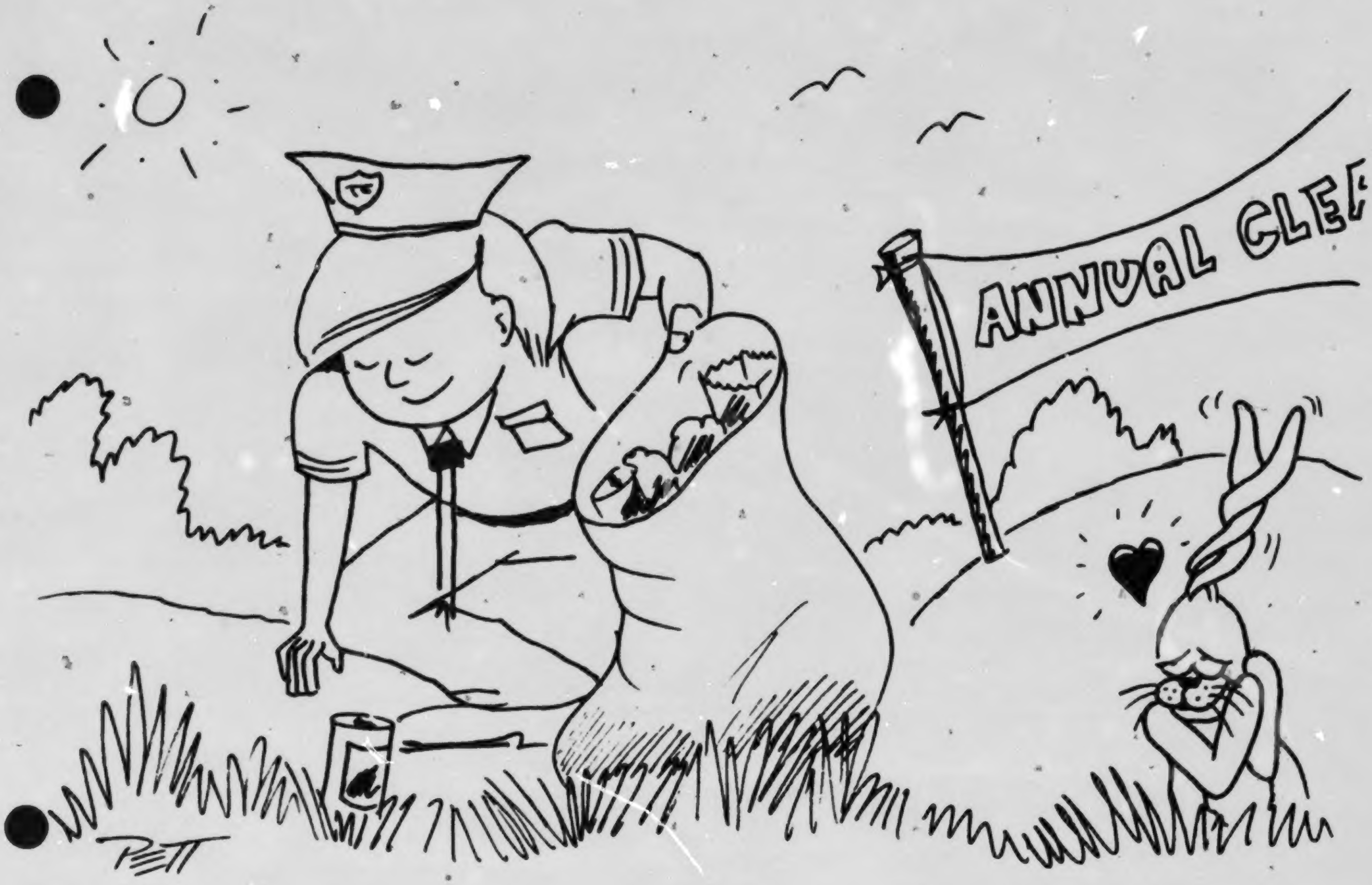
LESSON 1-4: PICTURE 4-1







LESSON 1-4: PICTURE 4-2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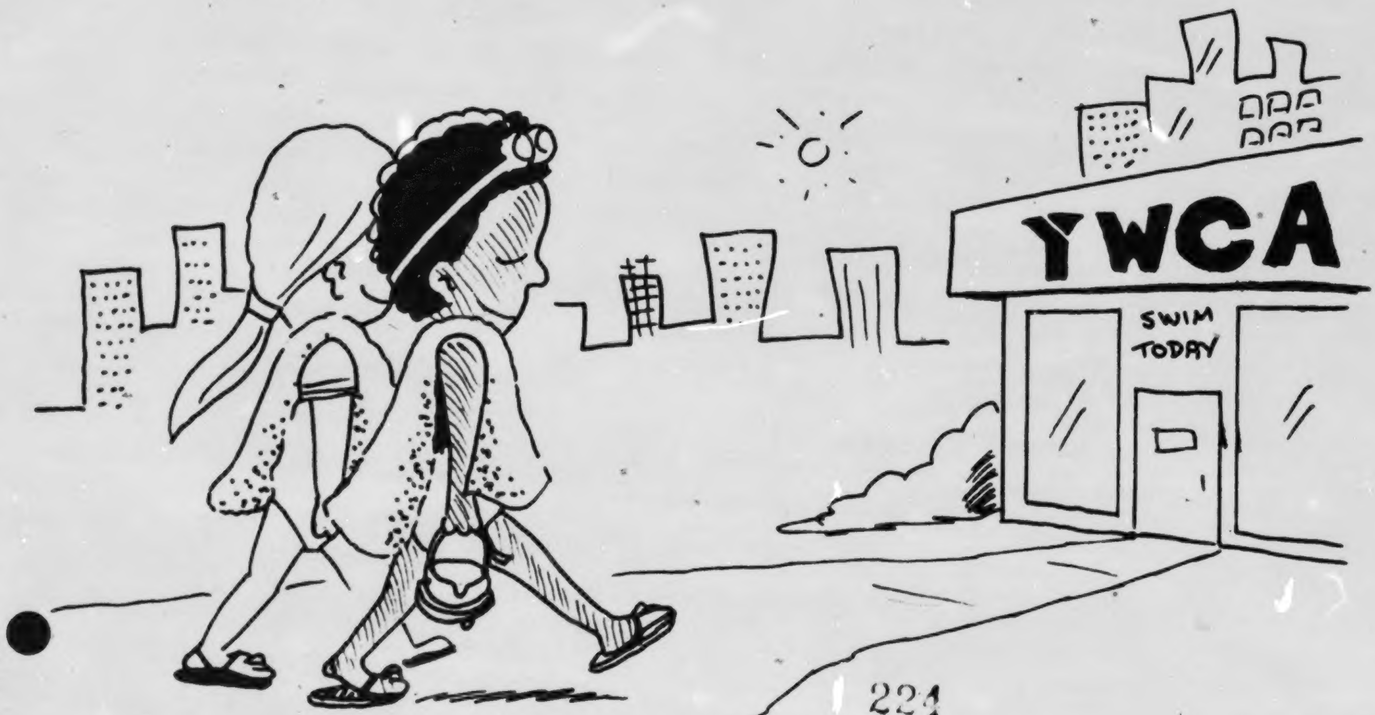
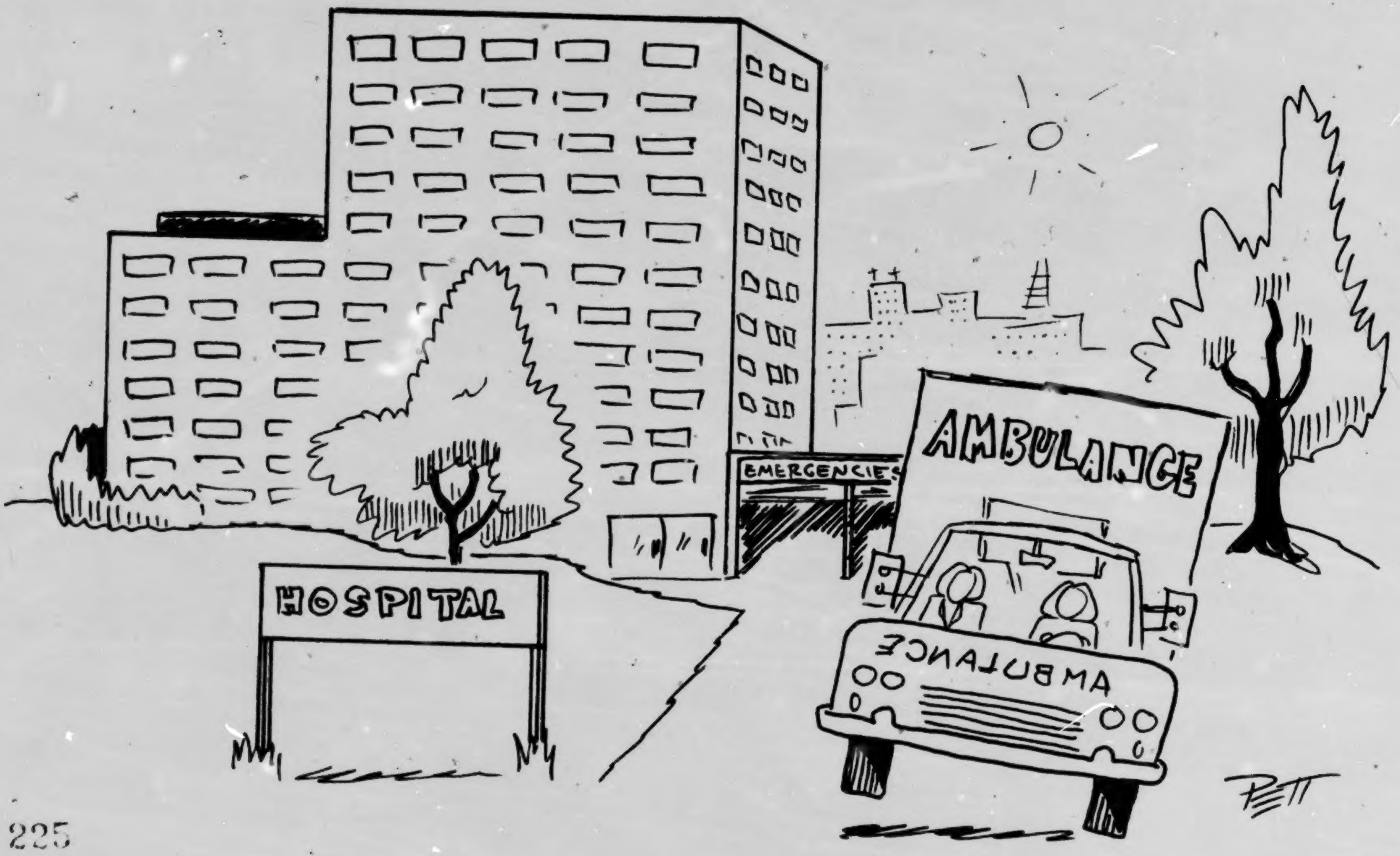

YWCA
SWIM TODAY


HOSPITAL
EMERGENCIES
AMBULANCE
AMBULANCE

LESSON 1-4: PICTURE 4-3

LESSON 1-5: PEOPLE IN GOVERNMENT

Rationale

One very important actor in the energy area in any community is its government. Whether it is a city, a county, or a town government, people in governments make decisions that affect energy. They also use energy to run the government in important ways.

In this lesson, students will become aware of the various ways in which community governments use energy and make laws which affect the energy problem. Students will also be encouraged to take action in conjunction with a government agency in helping to save energy.

Objective

Students will become aware of the way governments use energy and how government laws affect energy problems. Teachers can assess the attainment of this objective by students' responses to Activity F of this lesson or through the use of Assessment Activity 1.

Main Activity

A. Discuss with the students what the word "government" means. Put the word "government" on the board or on a big sheet of paper. Ask students what they mean when they think of government in their community. They can probably think of the mayor, maybe the police department, and other agencies that are involved in community government. Talk with them about how their government makes rules or laws which apply to everyone in their community. From this discussion, students should have a variety of examples of people and places that constitute their community government. They may live under a municipal government in a town or city, or they may live under a county government. Students should understand what the basic form of government is and who is involved in their community government.

B. Now use the series of pictures that are attached to this lesson to talk with students about ways that government uses energy. A government uses energy in a variety of ways that are not unlike the way that energy is used in homes or in schools. They use lights and heat and paper, for example, in much the same ways that other institutions do. A government also affects energy use through the laws that it makes. It makes laws about the construction of roads and homes, speed limits, recycling, and, in effect, it makes policies that influence schools. Students should understand that in both of these ways a government affects the energy problem.

Picture 5-1: The Mayor. Here the mayor is speaking to a group of people in a community. Lights are being used and heat is being used in the building where the mayor is speaking. All of these many activities that a mayor undertakes to listen to the people and to talk to them involve the use of energy.

Picture 5-2: Paper. The government uses a lot of paper which is an energy product. People in governments send a lot of memos. Laws are made which are written on paper. People in government communicate to each other and to the public using paper media. Students should see that the volume of paper used by a government is considerable.

Picture 5-3: Laws. A government also makes laws about highway construction, speed limits, recycling of products, where homes can be built. All of these laws affect the use of energy. They may even have some laws about energy itself.

As you talk with students about various ways that a government can use and affect energy, make references to their own community. If their community has a city energy board or committee, be sure that the students are aware of that.

C. Have students color the pictures cited above or draw their own pictures or make a collage of pictures from magazines about government and the energy that a government uses. If students are making or coloring pictures talk with them as they color or draw about how the government uses energy in the picture they are working with.

D. Bring someone from government into class. This person should talk with the students about how their government uses energy. Otherwise, you may want the students to visit the town or county courthouse or the government buildings in your community. They should prepare a set of questions to ask to the people in government with whom they talk which involves how government uses energy and how its laws affect energy use in their community.

E. Tell students to collect sources of evidence about how their government uses energy. They may wish to collect pictures from magazines or newspaper articles. They may wish to talk to other people. Students should practice their skills in using sources of information to gather evidence about a variety of ways in which their government uses energy. When students have collected their evidence, then have them talk with the class as a whole about what they have found to deepen and improve their understanding of how their government uses energy.

F. After students have had the discussion of ways in which their government uses energy, lead a discussion with them about how their government could save on energy and ask students the following questions:

1. What energy products does the government use? (e.g. paper, pencils, lights)
2. What seems to be a product that the government uses a lot of? (e.g. paper)
3. What ways could the government save on energy? (e.g. use less paper, make a law that would affect the community)
4. How might we help the government to save energy? (e.g. We could work with the city clerk, the city council.)

Now talk with students about one or two specific ways in which the class as a whole could work with the government in helping to save energy. Have them list the ways in which energy could be saved and how they might be able to help people save energy. Then help the students write a report to the person who visited their class or with whom they visited at the government building with their recommendations for how the government could save energy.

G. Be sure that the report is sent to the person who has visited the class and that that person makes some kind of response. If they genuinely want the class to help them to save energy then the task should be implemented. Be sure that the task is being actually carried out and that you talk with students periodically about their progress in working with the government on saving energy.

Grade Level Adaptation

K-1: You should collect some pictures from your local newspapers or magazines about how the government uses energy and how it makes laws. Then take your students on a tour of a government building and have them talk with one person or another about ways in which the government uses energy and how it affects energy laws.

4-6: Have students work in groups to study one government agency and how it uses energy. Have them make reports to the class on how that agency uses energy and how they might help the agency to save energy.

Language Arts Adaptation

K-1: Have students work in teams and pretend that they are interviewing someone in the government about energy use. Have them put their interview on tape and play the interview back to the class. Have students talk about the questions that the interviewer is asking and the kinds of questions that they have about the governmental use of energy.

2-3: Have students pick out the stories that they are currently reading which show how the government takes action, particularly on a public issue. Relate this to the energy question.

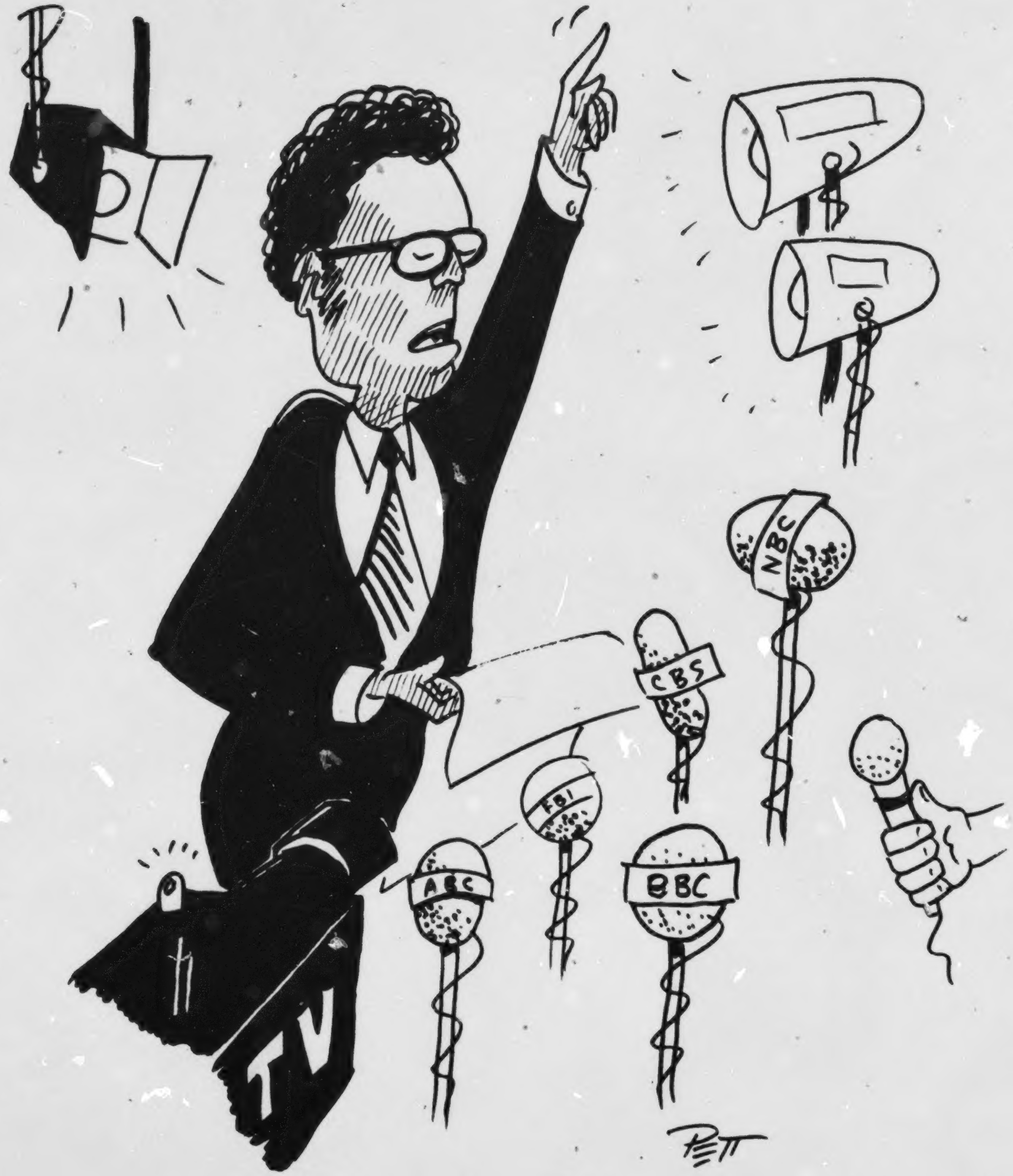
4-6: Have students do reports on a government agency which they are studying that can be submitted to that agency.

Math Adaptation

K-1: Have the students count the ways in which the person who they talked with from a government agency said that the government used energy. Then have them compare the ways in which that agency uses energy to the ways that energy is used in their homes or in their school.

2-3: Have students ask the person who is interviewed how much paper his or her agency of government uses per day. Then have students count how much paper they use in their class every day. They should use addition and subtraction to determine whether or not they use more or less paper than the government agency.

4-6: Have students compare their surveys of government, people in service organizations, neighborhoods, and businesses to see which sectors of the community use the most energy.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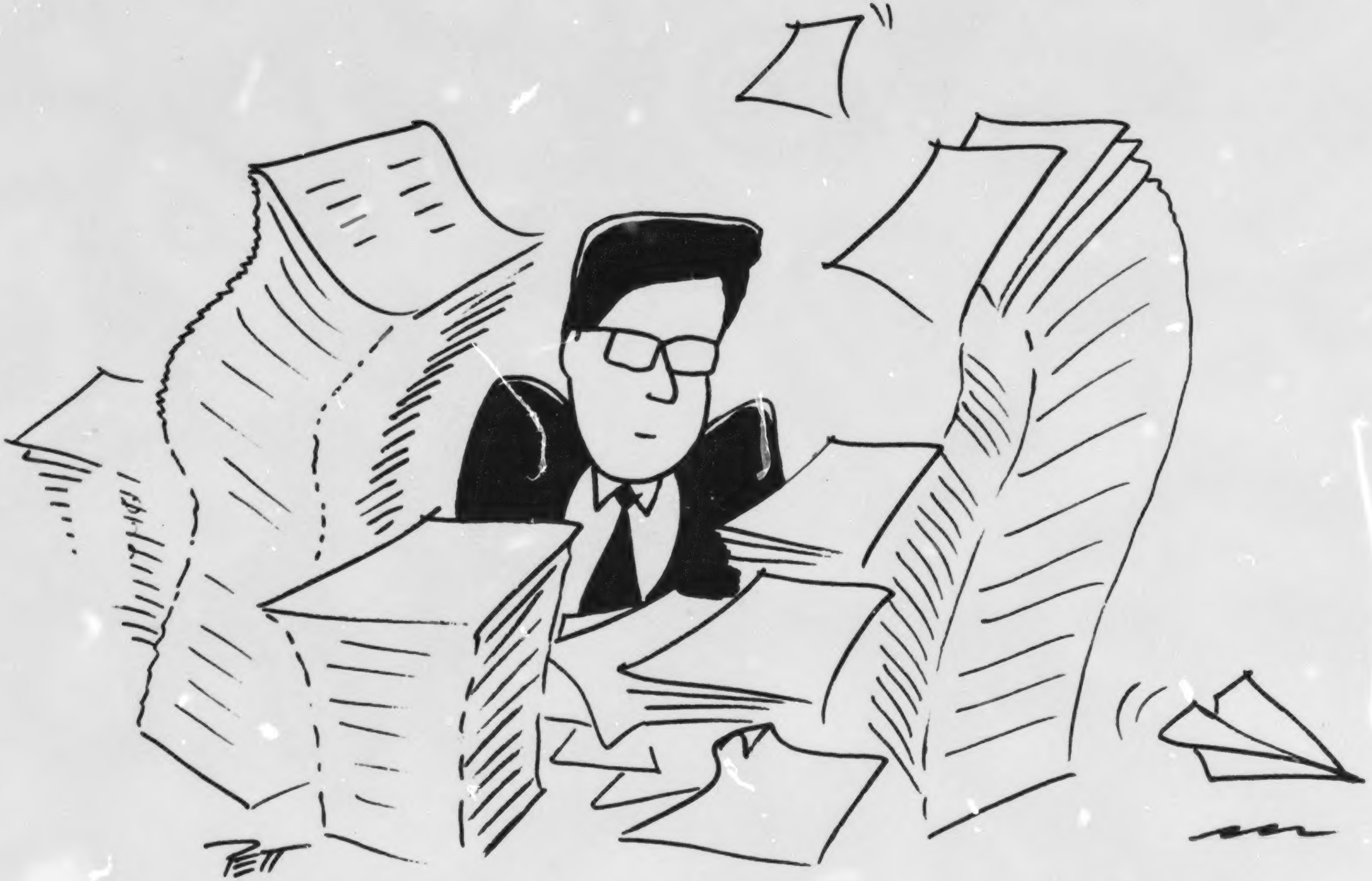
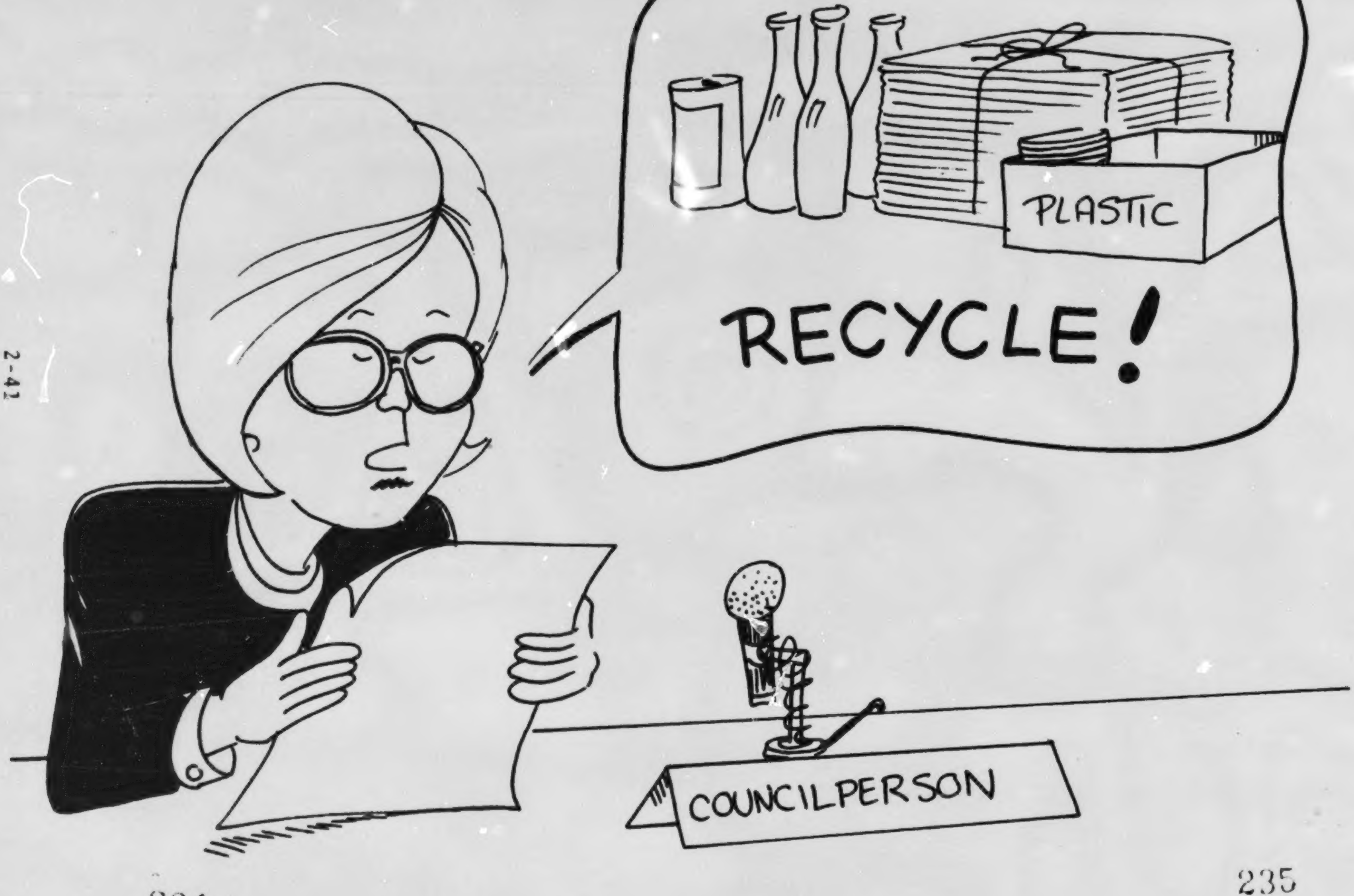


LESSON 1-5: PICTURE 5-2

2-41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LESSON 1-5; PICTURE 5-3

LESSON 1-6: TAKING CARE OF COMMUNITY ENERGY

Rationale

Students have become aware of various sectors of the community and how they use and can save energy. Here our goal is to put their knowledge to use in taking action on one well-defined task in taking care of community energy. It is important for students to be able to put their knowledge to use in their everyday lives in order for them to develop habits of energy conservation and to be effective energy actors.

Objectives

1. Students will rate saving energy in their community as a high priority in their lives. Teachers can assess the attainment of this objective by students' responses to Activity B in this exercise.

2. Students will know how to take care of energy in specific ways in their own community. Teachers can assess the attainment of this objective through students' activities in this lesson and through Assessment Activity 2 at the end of this chapter.

Main Activity

A. Help students to review the sectors of the community that they have learned about in this chapter including neighborhoods, businesses, service organizations, and people who work in government. Review with them the ways these groups use energy and how they have found ways that these groups can save energy. Ask students why they think saving energy in various sectors of the community is important. They should be able to tell you that saving energy involves saving money for other things that are important and saving energy is for everyone to share later.

B. Ask students what they think is the most important way that their community could save energy. Ask them to draw a picture, paint a picture, or build a picture using blocks or papier-mâché to illustrate a way the community could save energy. As students are doing their drawings or buildings, have them talk to you about why such energy saving is important. When the class has completed their projects, have them talk about what ways they can see to save energy and why saving that particular form of energy is important.

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C. Then select two or three ways that the class might work to save energy in their community. You may want to develop one class project or a series of class projects with students working in groups. Talk with students about how they might try to save energy according to the two or three things they thought were most important. Ask them to describe the steps that they would use in carrying out their energy-saving plan. Outline those steps on the board and help students to develop workable plans. If students are working in groups, review those plans with the class as a whole.

D. Bring in relevant people from the community to the class, depending upon what problems they select. Have the students talk with them about their plans and have the people make input and suggestions into how the students might actually work out their plans.

E. Then have students carry out their plans. Help them in any way that you can to carry out the steps that they have outlined. Periodically, talk with them about their progress in saving energy and why it is important.

F. When students have completed their activity, talk with the class about their successes in saving energy. Guide a class discussion using the following questions:

1. What energy products have we tried to save? (e.g. lights, paper)

2. Who has been involved in saving this energy? (e.g. the class, neighbors, people in government, people in service organizations, etc.)

3. What did we do to save energy? (e.g. We talked to people, we make decisions with them.)

4. Why is saving this energy important? (e.g. We save money, there will be more energy for everyone.)

Grade Level Adaptation

K-1: Have students identify some important ways they think energy can be saved in their community. Bring in relevant people to talk with them about how energy might be saved. Have students articulate their plans to these individuals and be sure that the individuals report back to the class on what they did as a result of the class suggestions.

4-6: Have students work on written plans that they could share with community agencies to help them save energy.

Language Arts Adaptation

K-1: Have students do a pantomime of various ways in which they think their community could save energy. Have other students guess what is involved in the pantomime and tell why saving this particular form of energy is important.

2-3: Have students develop the steps in carrying out their plans in writing, checking their steps for sentence structure.

4-6: Have students develop written plans in groups which can be presented to community agencies.

Math Adaptation

K-1: Ask one of the people who has come to class to give you the waste from his or her wastebasket for a day. Have students compare the waste of a government official to the waste in their wastebasket at school. Ask them questions such as who uses more energy and what forms of energy they use, and how energy can be saved.

2-3: Collect a set of figures that students can use to practice math functions. The figures should reflect ways in which various agencies in the community use energy.

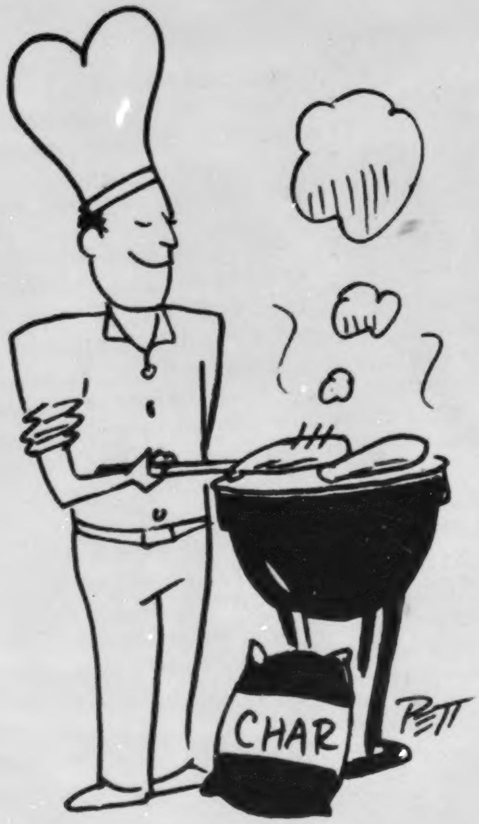
4-6: Have students include figures of energy use for the agency in their reports. Have them translate the figures into comparable figures for energy use so that the class can come up with a total for the agencies that they have studied in their community.

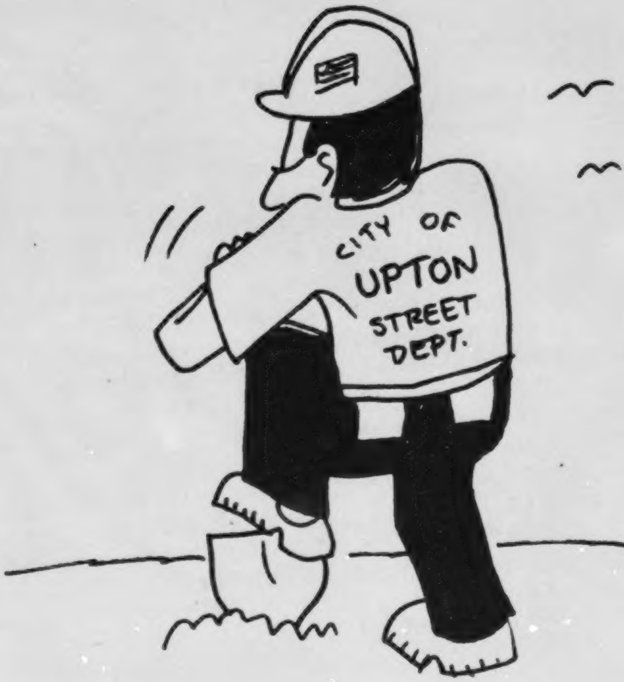
ASSESSMENT ACTIVITIES FOR CHAPTER ONE

These assessment activities are designed to evaluate students' awareness of energy sources in their community and how energy can be saved. Students' awareness, knowledge, and skills in taking care of energy will be assessed. These assessment activities can be used at the end of a lesson or at the end of the chapter as a whole.

Assessment Activity One. This assessment activity shows a variety of community agencies and how people use energy. Students should be able to pick out what sector of the community is involved (e.g. neighborhoods, businesses, service organizations, government) and how people are using energy. If this assessment is used after any single lesson, students can pick out which activity is related to that sector. If it is used at the end of the chapter, they can pick out all of the activities and determine which sector is involved with which activity.

Assessment Activity Two. Assessment Activity Two is a crossword puzzle that is designed to have students match community agencies and ways that they can save energy. They should be able to fill out the crossword using their knowledge from this chapter. There is an answer page included after the crossword which tells you the answers to the puzzle.

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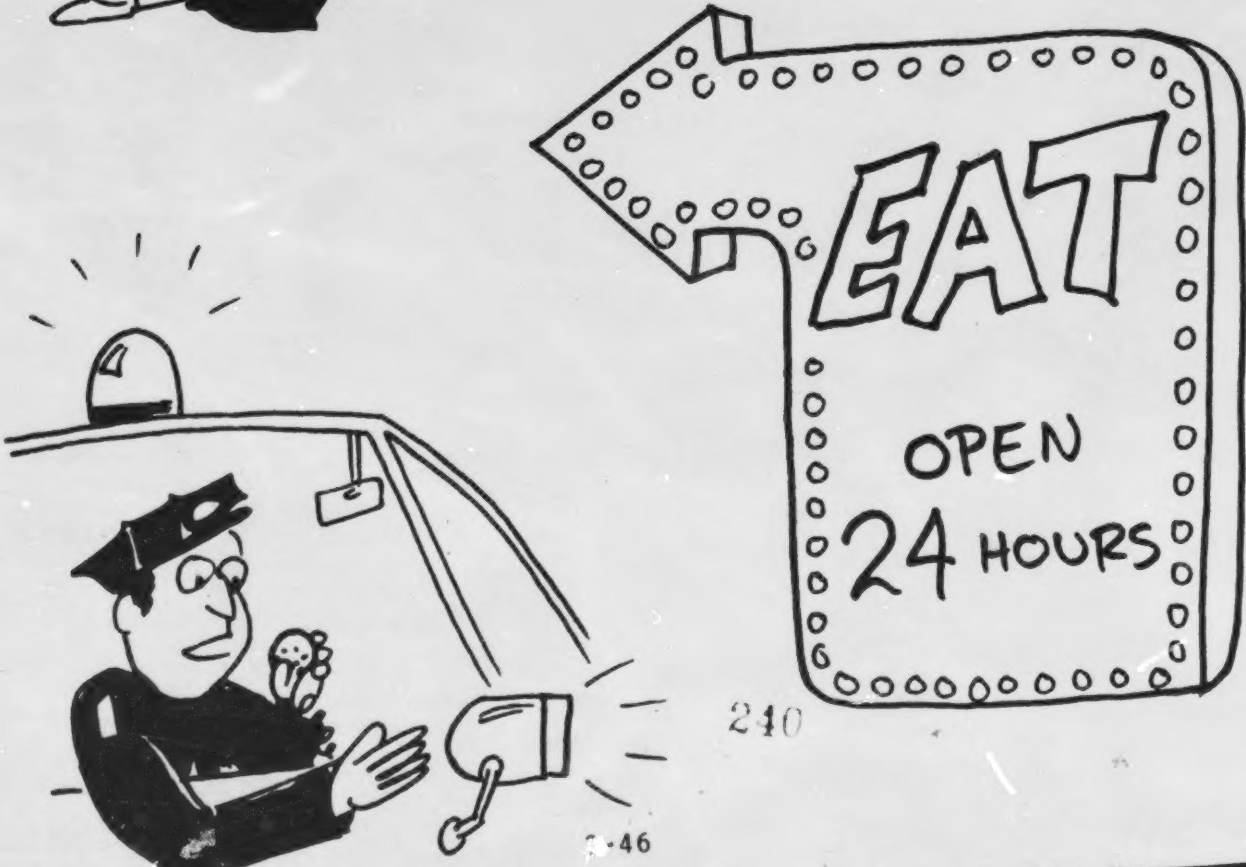
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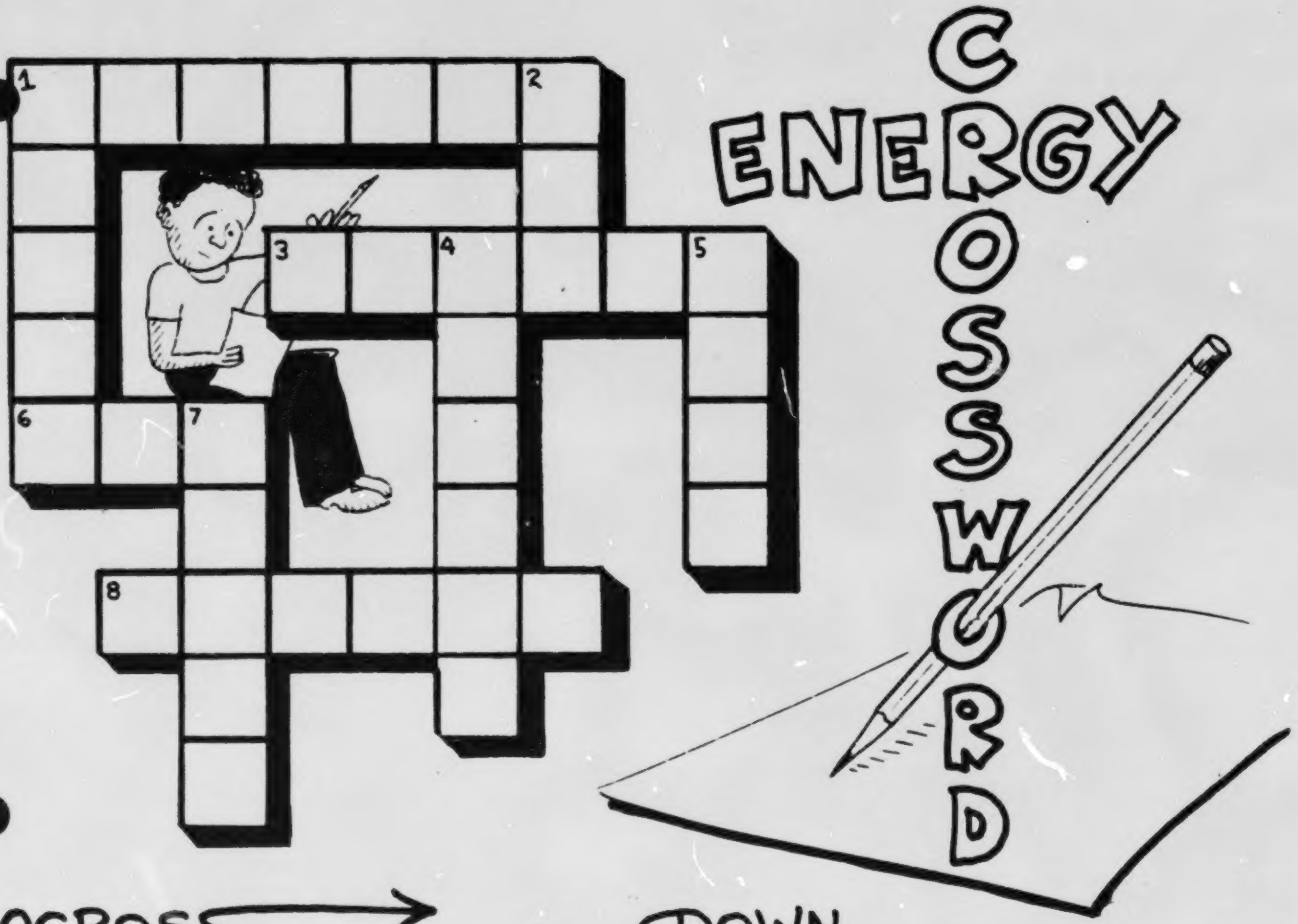


ACROSS

1. MOST OF THE ENERGY WE USE AT HOME IS FOR COOLING AND ________.

3. COAL, OIL, AND NATURAL GAS ARE EXAMPLES OF ________ FUELS.

6. USING THE SUNS ENERGY ON A WIDE SCALE IS A RELATIVELY _____ IDEA.

8. A LOT OF ENERGY IS USED BY PUBLIC SERVICE GROUPS TO PROTECT AND HELP CITIZENS. AN EXAMPLE IS THE ________ DEPARTMENT IN YOUR TOWN.

DOWN

1. "PERSON POWER" IS ______ ENERGY.

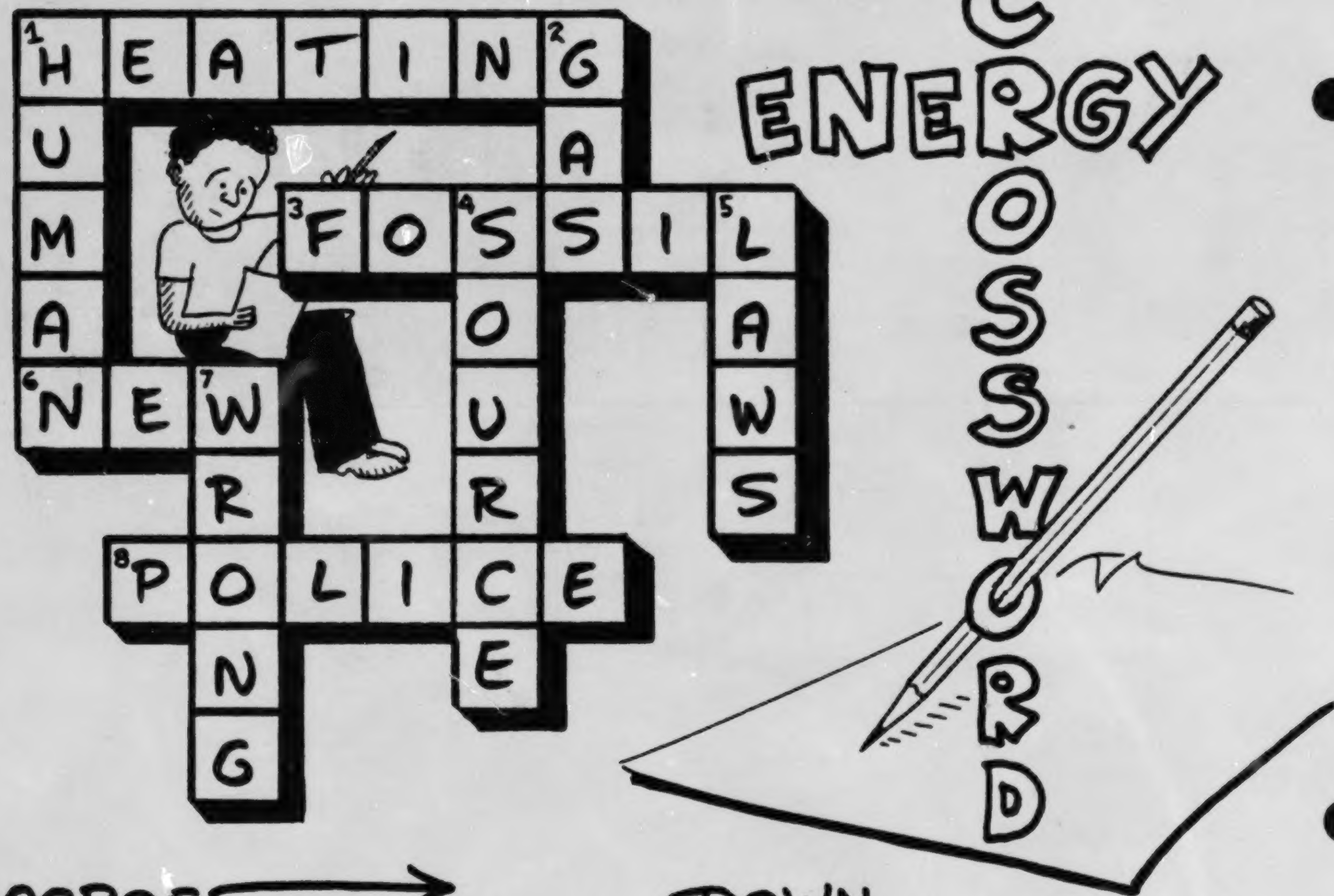
2. YOUR HOUSE IS PROBABLY HEATED BY ELECTRICITY OR ______.

4. THE EARTH IS THE MAIN ________ OF ALL ENERGY.

5. NEW ______, LIKE THE LOWER SPEED LIMIT, ARE A GOOD ENERGY-SAVING IDEA.

7. THOSE PEOPLE WHO DON'T THINK CONSERVATION IS IMPORTANT ARE JUST ______!

ENERGY CROSSWORD


1 HEATING
2 GAS
3 FOSSIL
4 SOURCE
5 LAWS
6 NEW
7 WRONG
8 POLICE
1 HUMAN

ACROSS

1. MOST OF THE ENERGY WE USE AT HOME IS FOR COOLING AND ________.

3. COAL, OIL, AND NATURAL GAS ARE EXAMPLES OF ________ FUELS.

6. USING THE SUNS ENERGY ON A WIDE SCALE IS A RELATIVELY _____ IDEA.

8. A LOT OF ENERGY IS USED BY PUBLIC SERVICE GROUPS TO PROTECT AND HELP CITIZENS. AN EXAMPLE IS THE ________ DEPARTMENT IN YOUR TOWN.

DOWN

1. "PERSON POWER" IS ______ ENERGY.

2. YOUR HOUSE IS PROBABLY HEATED BY ELECTRICITY OR _______.

4. THE EARTH IS THE MAIN ________ OF ALL ENERGY.

5. NEW ______, LIKE THE LOWER SPEED LIMIT, ARE A GOOD ENERGY-SAVING IDEA.

7. THOSE PEOPLE WHO DON'T THINK CONSERVATION IS IMPORTANT ARE JUST ______!

CHAPTER 2: USING ENERGY

Rationale

This chapter is intended to teach students about how energy is used. Generally, there are three patterns of energy use. Energy is wasted, or conserved, or alternatives are sought to using scarce energy. These three ways of using energy are the focal point of this chapter.

Students will learn about using energy in their own lives, both by human beings and in the environment.

Students will also see various profiles of people who are wasting and conserving energy, or using energy alternatives. They will use these profiles as a base for doing a study of their own use of energy and the impact of changing their energy habits.

Objectives

1. Students will become aware of a variety of uses of energy in their school, home, and community. (Lesson One)

2. Students will acquire knowledge about how human energy is wasted and conserved, and how alternatives are used in their own everyday lives and in their community. (Lesson Two and Three)

3. Students will acquire knowledge about energy sources, products, and their uses. (Lesson Three)

4. Students will set energy conservation as a high priority in their everyday lives. (Lesson Four & Five)

5. Students will apply their knowledge of energy waste to their own everyday lives. (Lesson Four)

6. Students will apply their knowledge about energy conservation to their school, family, and community. (Lesson Five)

7. Students will practice their consumer roles in trying to convince others that energy conservation is important. (Lesson Six)

LESSON 2-1: WHAT DO WE DO WITH ENERGY?

Rationale

The focus of this lesson is to make students aware of a variety of uses of energy. The lesson should stimulate them to think about a whole variety of uses to which we put energy and how we either waste it, conserve it, or use alternative energy products. Students will begin to move from identification of energy products to how they use them in different ways. They will learn some basic skills in how to take care of energy in terms of conserving it and using alternative energy products. These skills are important to the development of effective energy actors.

Objective

Students will become aware of a variety of uses of energy in their school, homes, and community. Teachers can assess the attainment of this objective by student responses to Activity E at the end of this lesson.

Main Activity

A. Use Pictures 1-1 through 1-3 that accompany this lesson to explain to students different ways they make use of a wide variety of objects. Products can be wasted or conserved, or people can use alternatives. Explain how people in the pictures are wasting things, conserving things, or using alternative forms of energy.

B. Discuss with students different ways that they waste objects everyday. Talk about how some of them may throw out good food, or may not fix toys, or may waste their own time as human beings. Then discuss with them how they conserve products, how they take care of leftover food or fix things that are broken. Also talk with them about how some of them use alternatives. If there is a shortage of lettuce, for example, they may use fresh vegetables and not have salads. The purpose of this discussion is for students to see how they waste, conserve, and use alternative things in their everyday lives. The discussion need not be particularly related to energy at this point.

C. Have students color the pictures with this lesson or draw their own pictures, emphasizing one important thing that they waste or conserve or use as an alternative in their everyday lives. As they are drawing the pictures or coloring them, have them explain to you what this thing is and why it is important to them.

D. Have students list the ways in which they waste, conserve or use alternative everyday objects. Have one list be constructed around some things that are not energy products. Have the second list be constructed around some things that are energy products, such as heat, light, crayons, or other materials. Have students compare the lists and see how wasting, conserving, or using alternatives is common behavior. Emphasize with them that effective energy actors try to conserve energy and use alternative objects when some energy products are scarce.

E. Finally, ask students to look at their lists and talk about why it is important not to waste energy or any other material. It is important to conserve it or find alternatives. Have them think about ways that they can move items from their list of things they waste to their list of things they conserve and why it is important to have a short list of things that they waste and a much longer list of things that they conserve or alternative forms that they can use. Students should be able to remove almost all of the things from their waster list onto their conserver list, and then from their conserver list onto the list of alternative products that they might use instead of the things that they are using now.

Grade Level Adaptation

K-1: Bring to class some energy products which students commonly use. Use these things as a basis for a discussion of the different ways in which students waste, conserve, or use alternative energy products.

4-6: Have students keep logs of a day in their lives and what products they waste or conserve, and what alternatives they use. Have them discuss the list and try to move things from their waster list to their conserver list, and from their conserver list to their list of alternative things they might use.

Language Arts Adaptation

K-1: Have students describe the ways that they waste or conserve energy every day using a tape recorder; then play back the tape for the class and discuss various things that the students mention.

2-3: Using the pictures that are enclosed with this lesson have students write captions which indicate what is wasted, conserved, or what alternative energy products are being used.

4-6: Have students write a story about things they waste, or conserve, or alternative products they use on an everyday basis.

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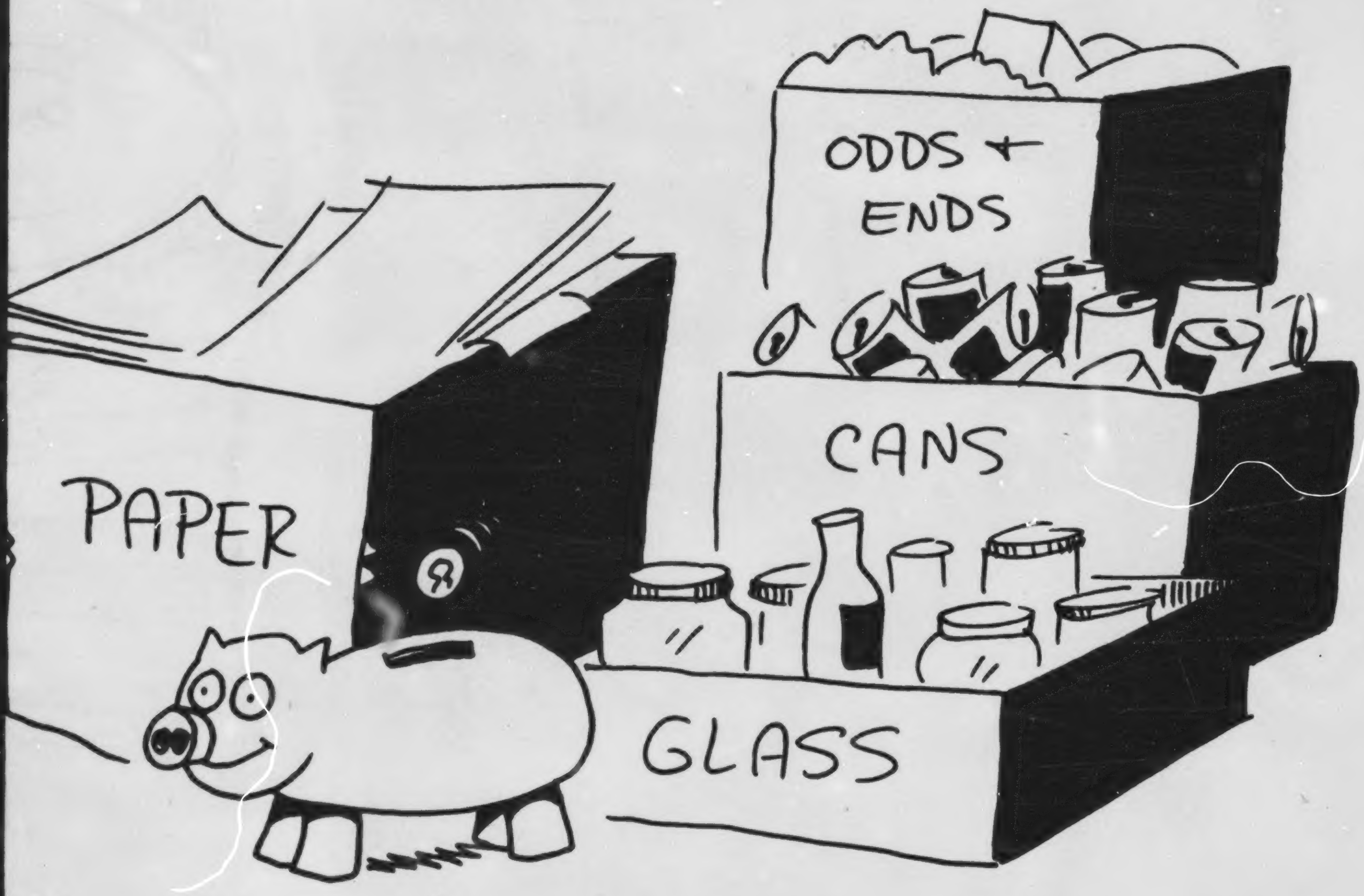
Math Adaptation

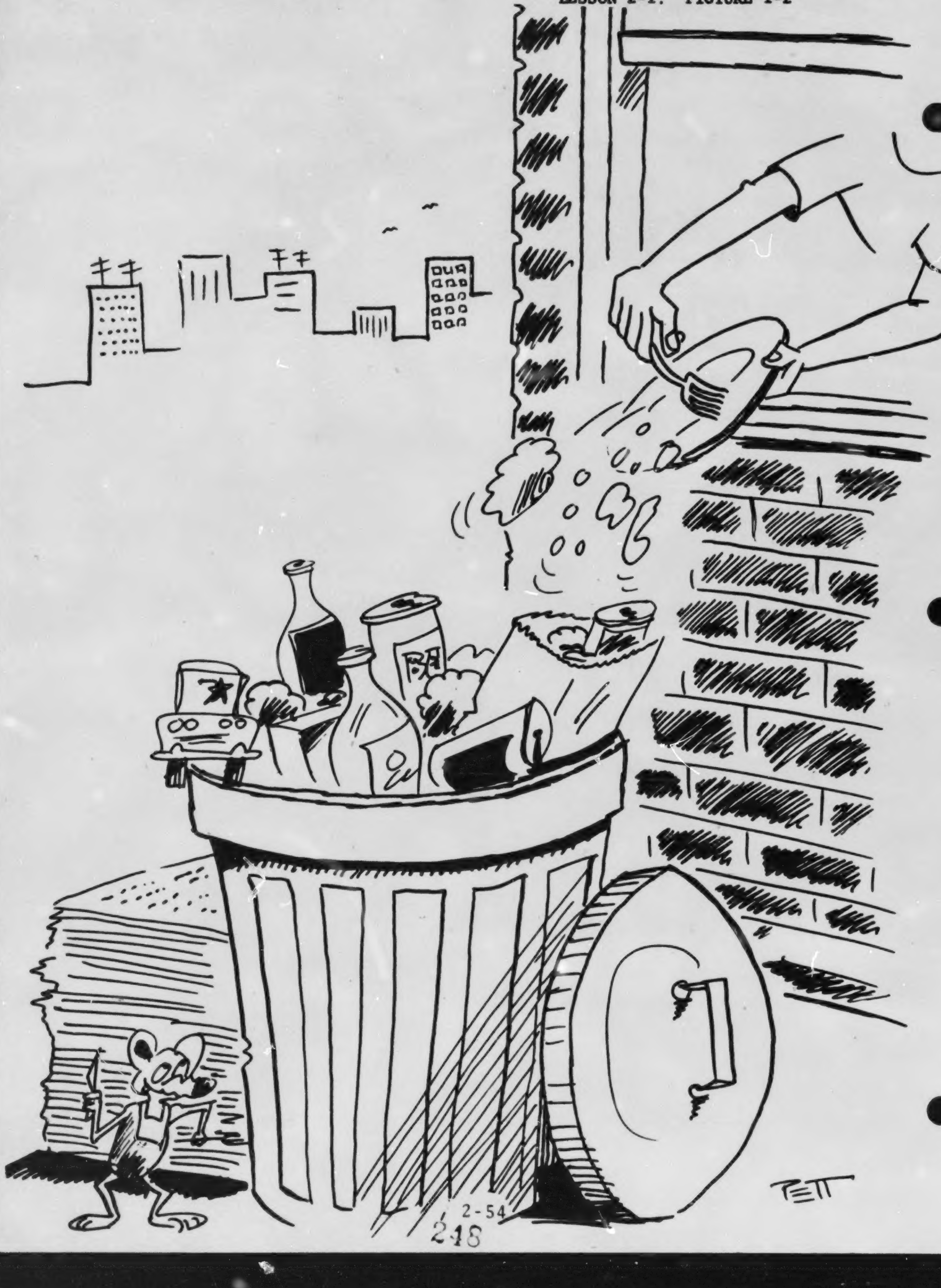
K-1: Have students put things in the three categories that are described in this lesson. See if they can get their energy waster list to include very few things and their energy conserver list to include very many things. Talk about the importance of having a much bigger list for conservation than for wastage.

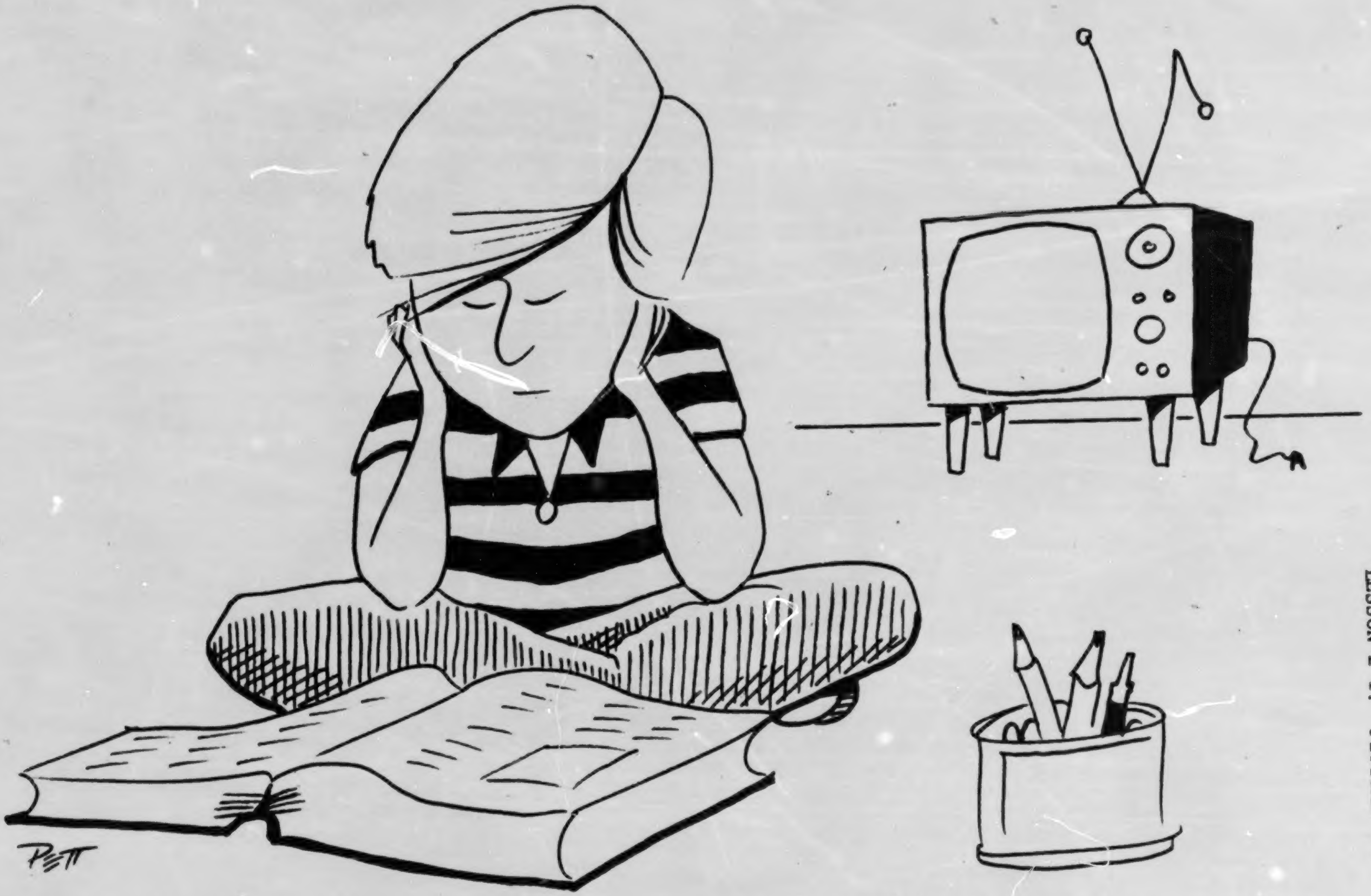
2-3: Have students add the number of ways they waste things, conserve things, or use alternative forms. Find ways that they can subtract things from their waster list to teach them addition and subtraction functions.

4-6: Have students determine the amount of time they spend using a light in their home. Ask them to calculate the number of watts they use by multiplication. Then have them calculate how much they conserve by using the light fewer hours.


ODDS + ENDS
CANS
PAPER
GLASS

LESSON 2-1: PICTURE 1-1


PETT



LESSON 2-1: PICTURE 1-3

LESSON 2-2: USING HUMAN ENERGY

Rationale

Students will learn about human energy and how it is used in their own everyday lives. They will use a case study to show how energy is wasted and conserved, and how alternatives are used on an everyday basis.

This lesson begins to increase students' knowledge about how they use their human energy in a variety of ways. It is an important lesson which links knowledge to action about the use of their own human energy.

Objective

Students will acquire knowledge about how human energy is wasted and conserved, and how alternatives are used in their own everyday lives and in their community. Teachers can assess the attainment of this objective through students' responses to Activity D in this lesson or through Assessment Activity I.

Main Activity

A. Review with students the material on human energy from Unit I. Human energy is body power and is affected by intellectual, physical, and emotional characteristics. They use energy every day. Use the case enclosed with this lesson on "Karen's Day" to talk with students about how Karen uses energy. Basically, the case illustrates how Karen wasted, conserved, and used sources of her own human energy in a one-day period. Ask students to identify ways that Karen's energy was used. Have them pick out ways she wasted energy, conserved energy, and used alternative energy sources. Then have students compare Karen's day with their own day and ask them how they use human energy on an everyday basis.

B. Have students make a list of the ways that they conserve and use energy alternatives in their everyday lives. Based on what they have said about their use of energy every day, they should be able to come up with some ways of how they can conserve or use alternative energy products. You can put this list on the board or have students work in small groups to develop a list for the group. The purpose here is for students to see how their own everyday lives illustrate the uses of human energy and how they might conserve human energy in their everyday lives. Discuss the list the students have prepared using the following questions:

1. What human energy do we use every day? (e.g. We use leg energy to walk.)

2. How can we conserve some of the energy that we use every day? (e.g. We can eat the proper foods and sleep the proper lengths of time.)

C. Bring someone into the class who has a very different lifestyle from the students, such as an exchange student. It might be another student or an adult. Have the students talk about ways they have outlined for conserving energy and using energy alternatives. Have the guest talk about ways that he or she lives his or her everyday life and uses energy and thinks that he or she can conserve it. Have students note the similarities and differences between their own lives and the life of this person.

D. Then ask students to choose three stories that they are currently reading which illustrate the waste, conservation, and use of energy alternatives. Have students present the stories to class. You may want them to take turns reading the stories. Discuss with students how they waste, conserve, and use energy alternatives in the stories and how the major characters in the stories might choose to save human energy. Students should by now recognize different forms of waste, conservation, and use of energy alternatives in the stories that they are reading. They should also be concerned about the waste of human energy and be thinking of ways of saving it.

E. Have students pick out one form of human energy that they waste regularly. Have them think of how they can conserve or use energy alternatives. Help them to try to conserve their human energy for a day or a week and talk with them about their success in their efforts.

Grade Level Adaptation

K-1: Read "Karen's Day" to students. Have them compare it to their day. Then use a picture or a plastic form of a human body and talk with students about the way they use their human energy. Also ask them about how they might be able to save energy every day.

4-6: Use a model of the human body as a basis for this lesson. Talk with students about how they waste, conserve, and use energy alternatives. Then have the students do a class survey on different ways that they use human energy every day.

Language Arts Adaptation

K-1: Have students draw a picture of themselves using human energy and then have them explain the pictures to other students.

2-3: Ask students to keep a log of the uses of human energy they made during the day. This log can be a simple word log or a sentence log, depending upon which language arts skills you are teaching.

4-6: Ask students to do a survey of the uses of human energy by students in their school. You might ask them to write a report on the answers they get to their survey.

Math Adaptation

K-1: Ask students to lift a heavy box or other object one foot (twelve inches) off the ground. Now have them lift the same box or object two feet (twenty-four inches) off the ground. They will see that the second activity uses more energy than the first. Continue this exercise to help students learn more about measurement with a ruler.

2-3: Have students count as many uses of human energy as they possibly can. Use the count to practice different mathematical functions depending upon what you are now teaching.

4-6: Ask the students to count their responses on their survey on the uses of human energy in their class or school. You may want them to draw graphs or to do other numerical calculations in their survey depending upon which math functions you are trying to emphasize.

KAREN'S DAY

Karen was a second-grader at Worth Elementary School. She liked school very much. She always ate a good breakfast so that she would have a lot of energy in order to do her lessons and play during the school day.

She spent so much time at breakfast, however, that her parents had to drive her to school rather than have her walk. She did not particularly like to walk to school, although it was not very far.

Karen liked most subjects, but she did not like math. During math class she rarely listened to the teacher and she shuffled her feet. Some day, perhaps, she would like mathematics.

During lunch she often decided not to eat because she talked with her friends so much that she did not have time to eat the lunch that her mother had prepared.

Karen always ate dinner. After dinner, instead of watching the television, she often discussed what was going on in school and in her community with her parents. Otherwise, she would look at books or play with friends.

At 9:00 o'clock every evening Karen went to bed. She always wanted to get a good night's sleep so that she could have a good time during the next day.

LESSON 2-3: USING ENERGY PRODUCTS

Rationale

Students will review the energy sources and products and see ways in which they are wasted and conserved, and in which alternatives are used. They will apply what they know to their everyday lives and their community.

Knowing about energy sources and products and their use is as important as knowing about human energy. The emphasis here will be on knowledge of different ways energy is used. Students will also transfer their knowledge into one activity through which they will try to conserve energy sources and products.

Objectives

Students will acquire knowledge about energy sources and products and their use. This objective can be assessed by using student responses to Activity E in this lesson or by Assessment Activity One at the end of this chapter.

Main Activity

A. Review the sources of energy and types of energy products with the students. Be sure that they include the fossil fuels and energy products, such as crayons and paper, in their classroom and in their community. Have students speculate about how they think energy is wasted and conserved, and how alternative forms can be used based on their knowledge of energy use in their community. If students cannot think of examples, provide some in terms of wasting energy by opening windows when the heat is on, conserving energy by turning the thermostat down. Students should, at this point in the Unit, be able to speculate about how possible waste and conservation or alternative uses of energy are accomplished in their own local environment.

B. Use the pictures that are enclosed with this lesson to illustrate different ways that energy is wasted and conserved, and how alternative forms are used. Have the students pick out the instances of waste in the pictures. Pictures 3-1 through 3-2 illustrate energy waste in terms of home heating and gasoline for cars. Then have them pick out instances in which conservation is being undertaken. The major ways that are conserving that are illustrated in Pictures 3-3 through 3-5 include dialing down the thermostat, insulating homes and building, driving slower and less often, driving smaller cars, using mass transit like buses or planes, and recycling paper and other such products. Finally, have students speculate about alternative forms of energy that can be used. Solar energy is illustrated in Picture 3-6 as a major alternative to using fossil fuels. So is nuclear energy. In Picture 3-7, electric cars are an alternative that is being considered, and of course, there is always our old friend, person power. When students have completed looking at the pictures, have them speculate about how these instances apply to their own everyday alternative lives in their community. Have them think of instances in which they waste, conserve, or use alternative forms of energy in their own everyday lives.

C. Now help students to do a log of their own everyday lives and ways in which they waste, conserve, or use energy alternatives. Students should start with the time they wake up one way until the time they wake up the next day. They should be able to see instances of waste and conservation, and alternative uses of energy sources in their own everyday lives. They can write down words or sentences, depending upon how you wish them to keep their logs.

Once students have completed their logs, you should guide a class discussion using the following questions:

1. In what ways do we waste energy every day? (e.g. We waste energy by driving cars, by using too much paper.)

2. In what ways do we conserve energy everyday? (e.g. We may use fewer lights or dial down the thermostat.)

3. How might we conserve more energy? (e.g. We can turn thermostats lower; we can turn off lights.)

4. Do we use any energy alternatives in our everyday lives? (e.g. We may use solar or nuclear energy or use fewer oil-intensive products.)

5. How might we conserve more energy? (e.g. We can use less or use things less often.)

D. Ask a guest speaker from an energy agency or a utility company to come to class and have that person talk to students about ways he or she sees that energy is wasted or conserved, or that alternatives are used in the students' community. Have him or her try to expand the students' knowledge about energy sources and products and their use in their community.

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E. Now ask students to search out stories in newspapers and magazines for each category of energy use including wasting energy, conserving energy, and using energy alternatives. Ask students to see whether or not they think there are models for energy conservation for alternative uses of energy that apply to their everyday lives. Are there also instances of waste that are applicable to them? They should be able to see that by looking at other things that people are doing, they can apply energy conservation to their own everyday lives.

F. Now have students choose one model of energy conservation that they have found in their stories or that they can think of on their own. Have them try to conserve some energy source or product for a day or for a week. Talk with them as they are carrying out their conservation activity and have them report back to the class about their successes.

Grade Level Adaptation

K-1: You may want to use your own pictures for this lesson. You might want to focus on one thing that students can conserve in their environment and talk about the waste or conservation, or energy alternatives that can be used in its place.

4-6: Students may want to do a study of different ways in which energy can be conserved. One student or a group of students, for example, might do a report on solar energy. Another group of students might do a report on recycling. Students should then give their reports orally to class.

Language Arts Adaptation

K-1: Have students act out various ways in which energy can be wasted or conserved, or in which alternatives can be used. Have the class think of which of the three activities are being acted out by the students.

2-3: Have students use the pictures that are attached with this lesson and write a paragraph describing the energy waste, conservation, or use of alternatives that are illustrated in the picture.

4-6: Have students do a report on some form of new energy technology. They should be able to see both the pros and cons of using new energy sources.

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Math Adaptation

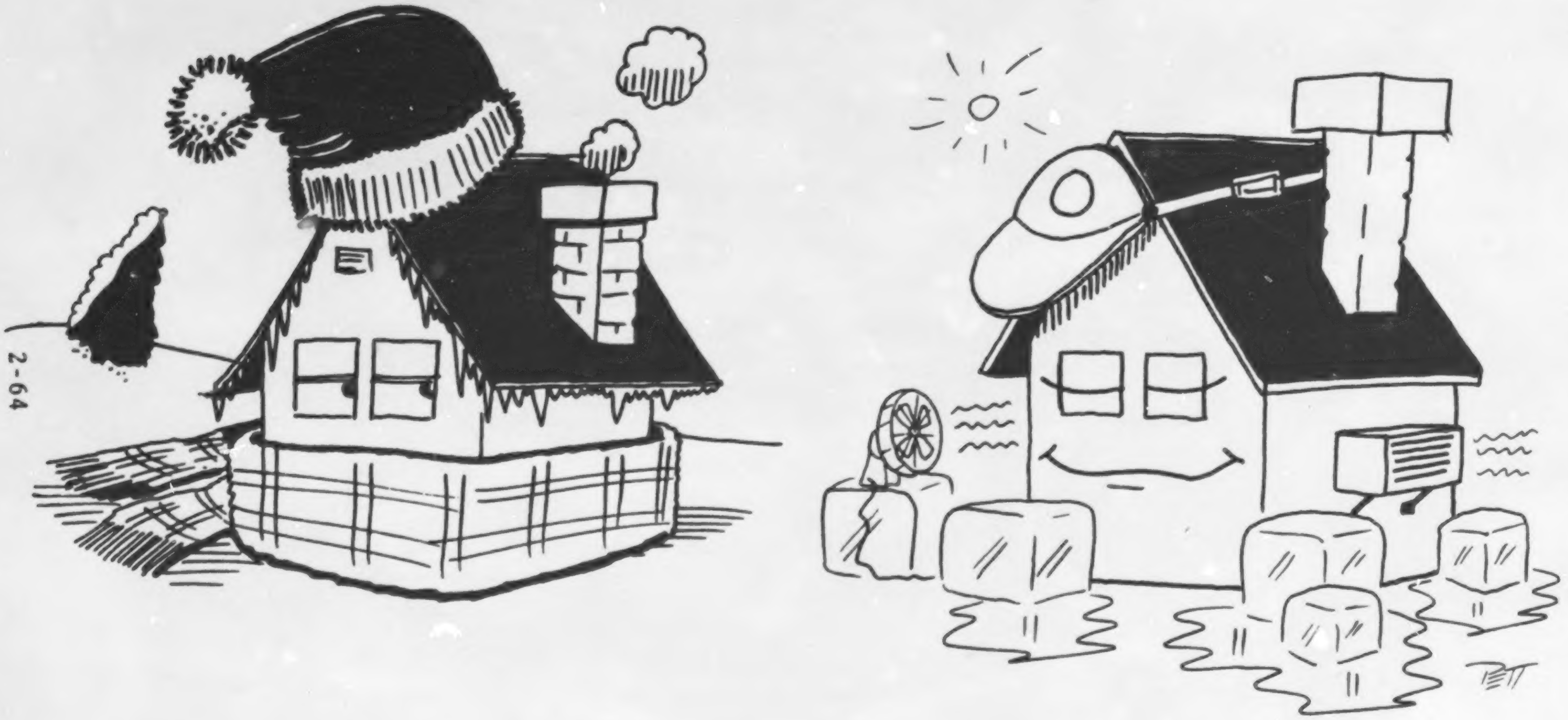
K-1: Use the clock to talk with students about the times when they waste or conserve energy. You can help students improve their knowledge of time using this activity.

2-3: Have students keep a log of their day and the times when they do things. They then should be able to divide their day into times that they waste, conserve and use energy alternatives. Students should be able to come up with group or class totals and use addition and subtraction functions.

4-6: Use students' logs to come up with class totals on energy waste and conservation, and the use of alternatives. Students can improve their knowledge of time using their logs as well as practice basic math functions.

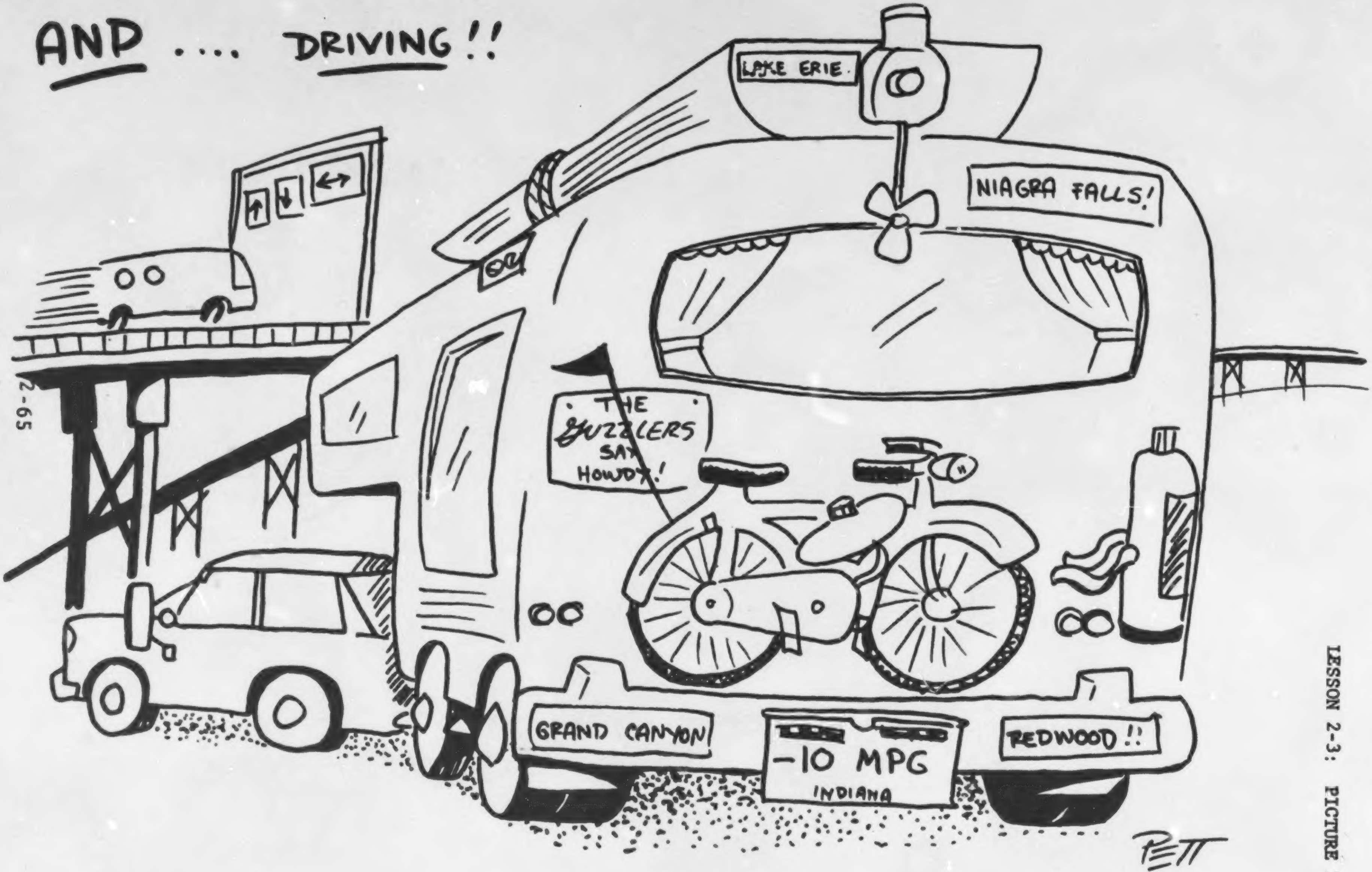
WE USE MOST OF OUR ENERGY...

2-64



LESSON 2-3: PICTURE 3-1

...TO HEAT AND COOL OUR HOMES....

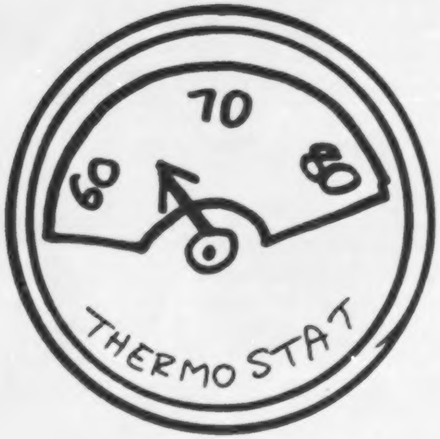

AND .... DRIVING!!
LAKE ERIE
NIAGRA FALLS!
THE GUZZLERS SAY HOWDY!
GRAND CANYON
-10 MPG
INDIANA
REDWOOD!!
PETT

2-65

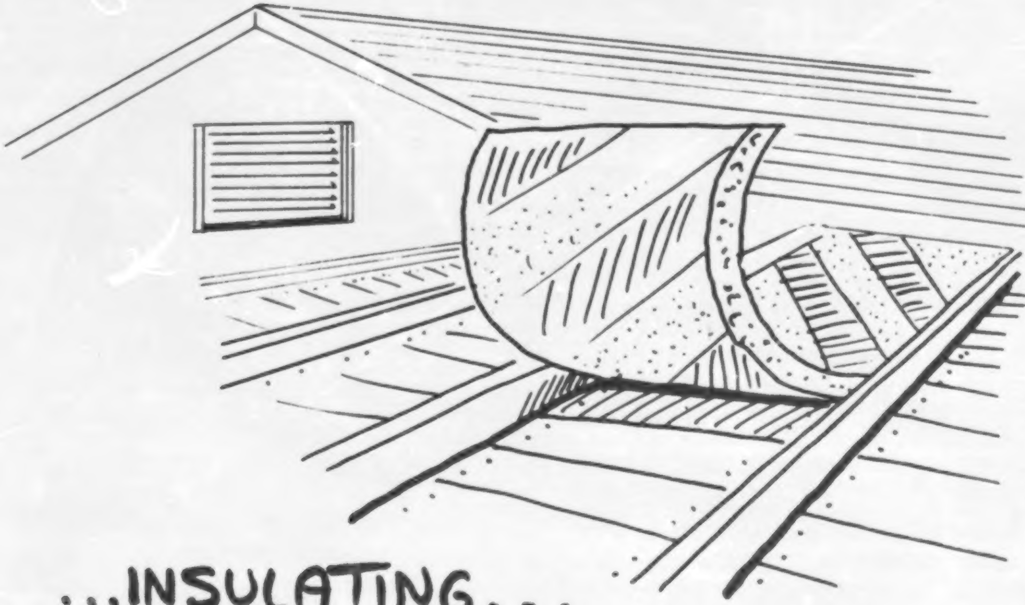
LESSON 2-3: PICTURE 3-2

WE CAN SAVE ENERGY BY...

2-66


70
60
80
THERMOSTAT

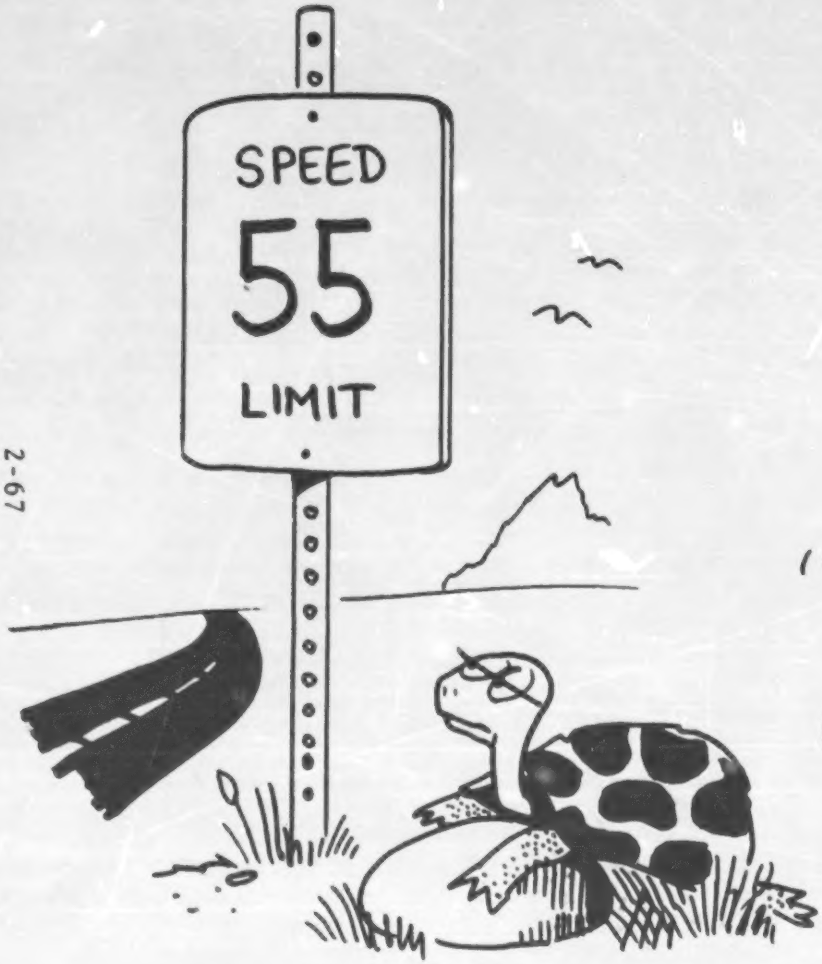
DIALING DOWN...



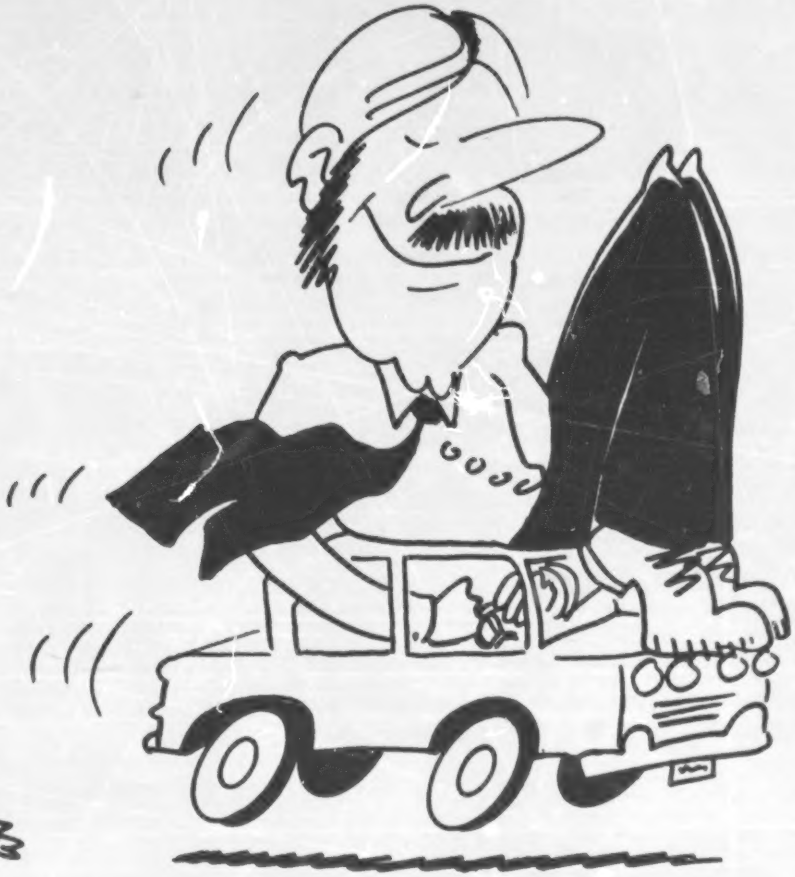
...INSULATING...

LESSON 2-3: PICTURE 3-3

2-67


SPEED
55
LIMIT

...DRIVING SLOWER AND NOT AS OFTEN....

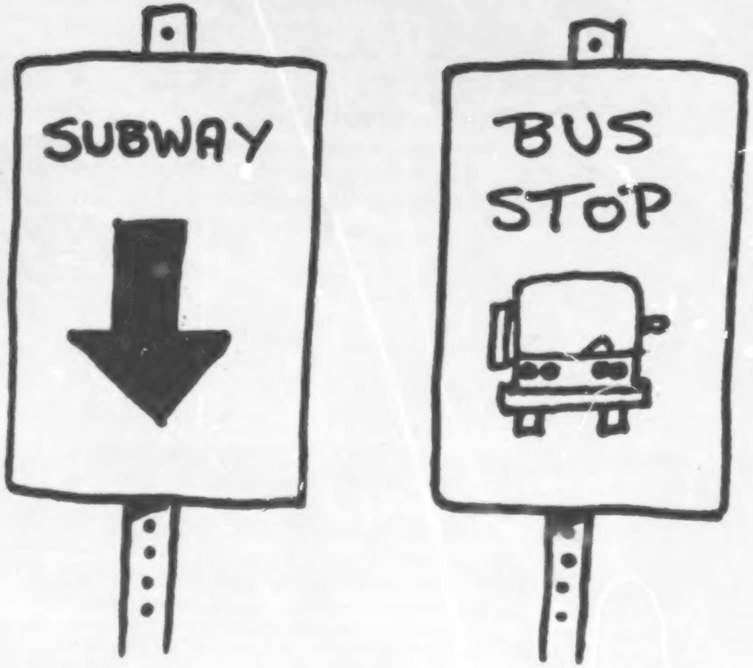


...DRIVING SMALLER, LIGHTER CARS...

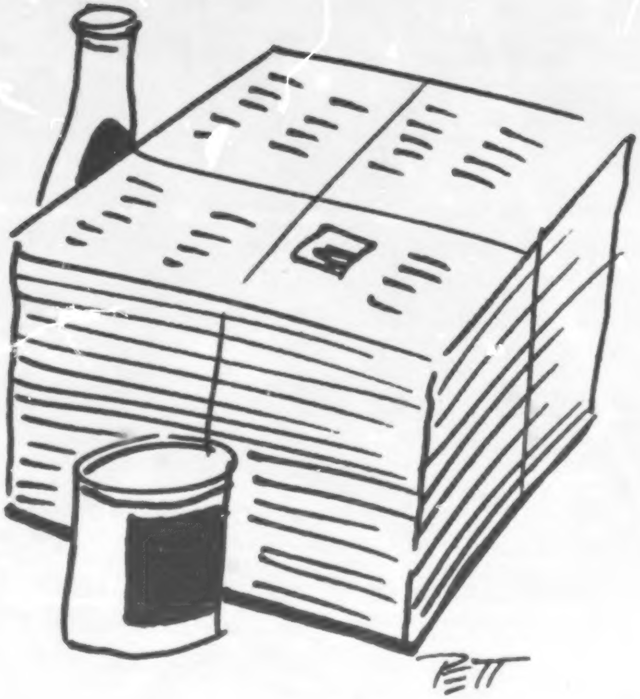
LESSON 2-3: PICTURE 3-4

2-68

LESSON 2-3: PICTURE 3-5

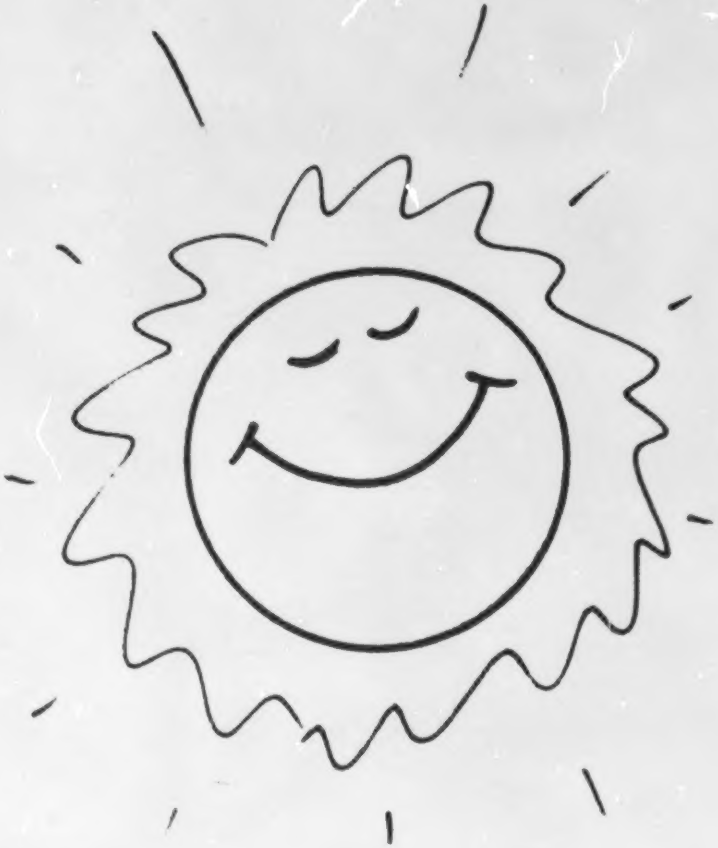

SUBWAY
BUS STOP

...USING MASS TRANSIT ...

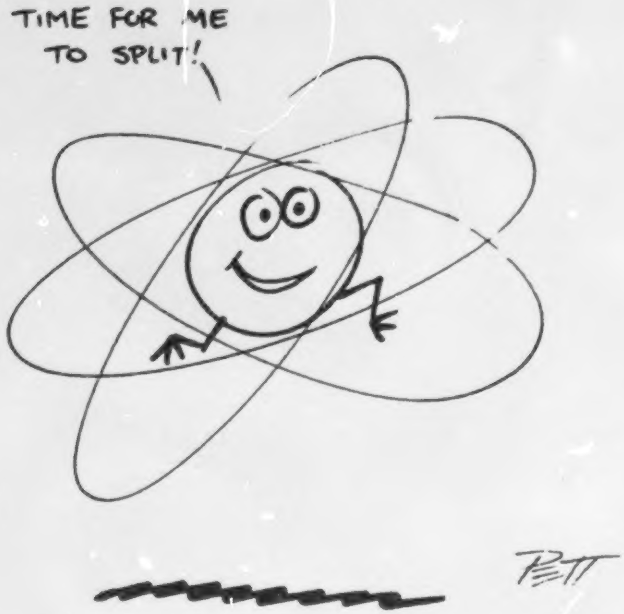


...RECYCLING....

WE CAN USE...



... SOLAR ENERGY...

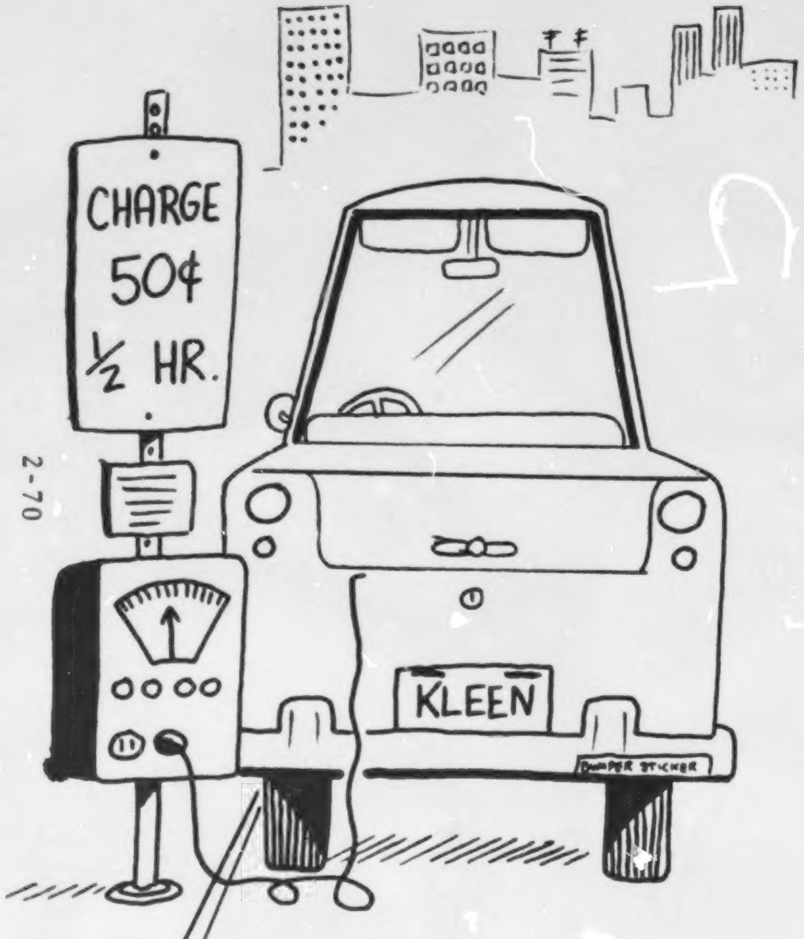

TIME FOR ME TO SPLIT!
PETT

...NUCLEAR ENERGY...

2-69

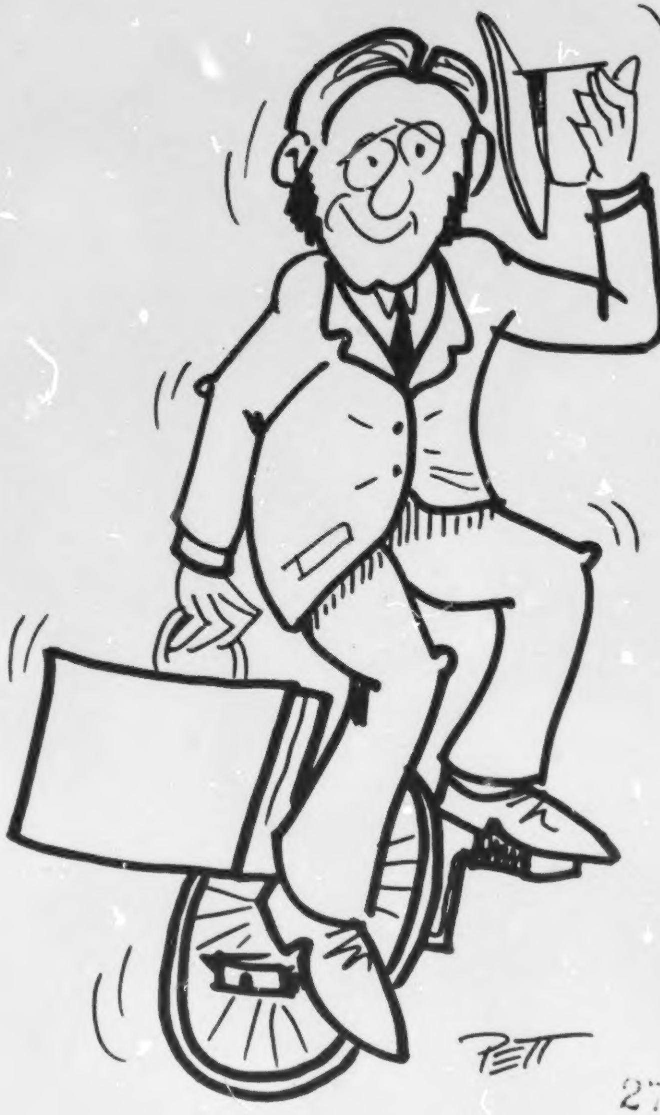
LESSON 2-3: PICTURE 3-6

2-70


CHARGE
50¢
½ HR.
KLEEN
BUMPER STICKER

271

...WHY NOT ELECTRIC CARS?



272

...AND PERSON POWER!

LESSON 2-3; PICTURE 3-7

LESSON 2-4: WASTING ENERGY PRODUCTS

Rationale

Students have learned in the previous lesson about saving energy. In this lesson, students will apply their knowledge about wasting energy to their own everyday lives and their community. They will speculate about the largest energy wasters, and study a cartoon strip which will show them examples of energy waste. They will apply their Energy Waster Index to their own lives, and gather evidence about energy waste in their community. They will also make plans for energy conservation in the areas of waste that they have identified.

The purpose here is to link students' knowledge to their everyday lives by teaching them ways energy products are wasted and how they can participate in energy conservation. This link between knowledge and action is important if students are to use their knowledge in useful ways in the energy area.

Objectives

1. Students will set energy conservation as a high priority in their everyday lives. Assessment of this objective can be made by students' responses to Part G and Part H of this lesson.

2. Students will apply their knowledge of energy waste to their own everyday lives. Assessment of this objective can be made by students' recommendations to reduce waste in Parts H and I of this lesson and by using Assessment Activity 2 at the end of this chapter.

Main Activity

A. Ask students to think about products they waste every day. They may waste food by not eating it and throwing it away. They may waste paper or crayons by only using a little bit and then throwing them away. Put the word "waste" on the board. List students' examples under it. They should see that waste is part of their everyday lives, and involves poor use of things. Ask them to compare the ways they waste products to the ways they have listed to save products.

B. Talk with students about how they also waste energy products. Use the list you have made on the board to talk with students about how some of their items in their list in Activity A involve wasting energy products (i.e. paper). Add some items that students suggest that involve energy wasting energy products.

C. Help students to more fully see one way that they waste energy products--they throw away things they could use, or others could use again. Explain to students that food can be saved, as can crayons.

Other items can be recycled. Used paper can be reused if it is collected, processed, and made into new paper. The same is true for cans and bottles. Ask students to bring in one item from home that could be recycled. You should bring comparable recycled products to class for discussion.

When students bring their items to class, talk with them about how they waste these items, and how they can be recycled. You may want to have someone from a recycling center come to class to talk about what is recycled, how it is done, and how important it is to their community.

D. Ask students to draw pictures or act out ways they waste an energy product and how it can be saved or recycled.

E. Now read, or ask students to read aloud, the cartoon strip on "Willy, the Waster." The cartoon strip indicates how people waste energy products in all of their consumer roles. Review with students the three roles of shopper, user, and disposer of energy. Tell them that there are instances in the cartoon strip in which energy products are wasted in each of these roles. Have them speculate about how energy products are wasted, and then have them answer the following questions:

1. In what ways did Willy waste energy products as a shopper? (i.e. He chose George the Can without thinking about the contents of the can.)

2. How did Willy use energy products wastefully? (i.e. He did not drink all of the contents of George the Can.)

3. How did Willy dispose of energy products wastefully? (i.e. He did not throw away the can in a place where it could be reused or recycled, or one that was safe.)

F. Students should then study the Energy Waster Questions, a way to tell whether or not energy is being wasted. The index is divided into three parts, including shopper, user, and disposer roles. The list should include a set of questions which pinpoint energy waste. The two questions under each category below indicate possible Energy Waster Questions that students could use.

ENERGY WASTER QUESTIONS

Shopper

1. Do I really need this product?
2. Is it best to use this product or another product?

User

1. When do I need to use this energy?
2. How much energy do I need to use?

Disposer

1. Do I need to throw this away, or can I use it again?
2. Can this be recycled?

Discuss the Energy Waster Questions with students. See if they think they cover all of the dimensions of possible energy waste for them, and for their community. Add or substitute questions developed by students.

G. Students should then give themselves a self-check in class, as small groups, or as individuals on the Energy Waster Questions. They should take a type of energy or an energy product, such as electricity, cars, home heating or school lighting, and determine answers to the questions on the index. Do they really need to use lights? Is it best to use the lights all the time? They should continue with these questions and determine whether or not there is wastage in the areas of shopping, using or disposing of energy or energy products they have selected.

H. Now ask students to select one type of energy or energy product they think they use a lot. (e.g. food, family car gasoline). They should get information (self-reports, observation, a log) about their use of this type of energy. They should then determine answers to the questions in their Energy Waster Questions. Have them bring their information and answers to class.

When students have finished collecting their answers, discuss them in class using the following questions:

1. What energy did you waste?

2. How did you waste that energy? (i.e. shopping, using, disposing)

3. How can you try to save energy? (i.e. recycling, using again, using less, using less often)

4. Why is saving this energy important? (i.e. saves money, saves energy for everyone)

I. Ask students to try to be more careful of energy based on their answers to Question #3 above for one week. Talk with them about their progress in saving this energy as they try to carry out their ideas.

Grade Level Adaptation

K-1: Teach the idea of "waste". Then identify one or two things students waste in their homes or classroom. Suggest ways they might try not to waste it.

4-6: You may want students to visit a recycling center. They can also keep logs of their plans to avoid wasting energy.

Language Arts Adaptation

K-1: Have students use puppets to talk about a specific energy product they waste and how it could be saved.

2-3: Have students devise some additional questions for the Energy Waster Questions. Or you may want them to use certain words or to develop sentences according to what you are teaching in language arts.

4-6: Have students report on changes that have been made as a result of their trying not to waste energy or energy products. They may write reports on these changes depending upon what language arts skills you are currently teaching.

Math Adaptation

K-1: Ask students whether they are using less energy or energy products as a result of learning about waste. Ask them to describe how they are using less.

2-3: Help students to quantify how much energy or energy products they are saving as a result of Activity I, using math functions you are currently teaching.

4-6: Have students do a graph or a chart of their own waste of energy or energy products. They can use statistics from their school, their home, or community life in order to draw the graph or the chart.

ENERGY WASTER QUESTIONS

Shopper

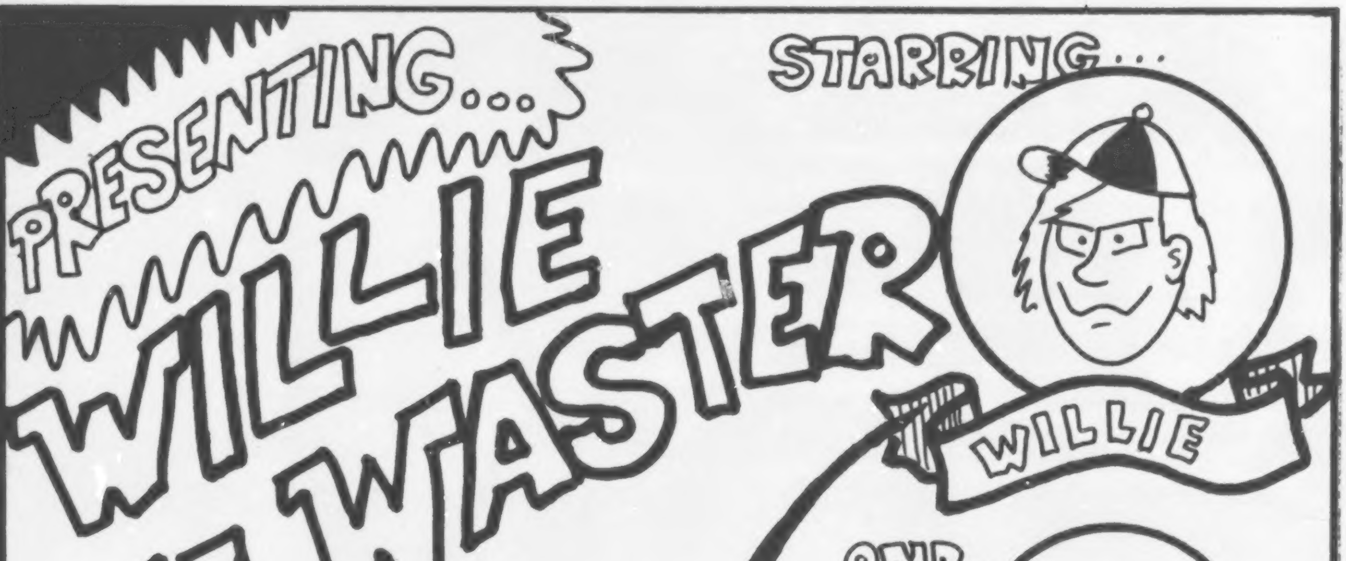
1. Do I really need to use this product?
2. Is it best to use this product or another product?
3. ____?

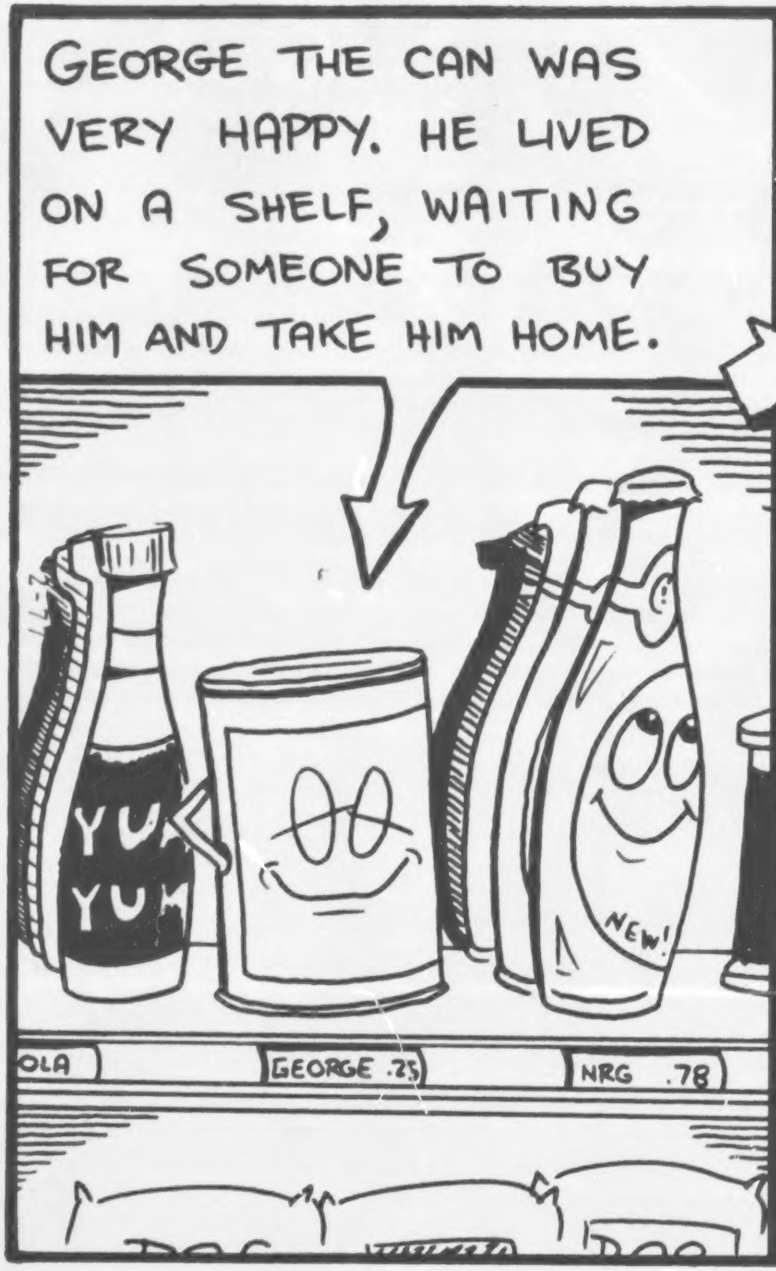
User

1. When do I need to use this energy?
2. How much energy do I need to use?
3. ____?

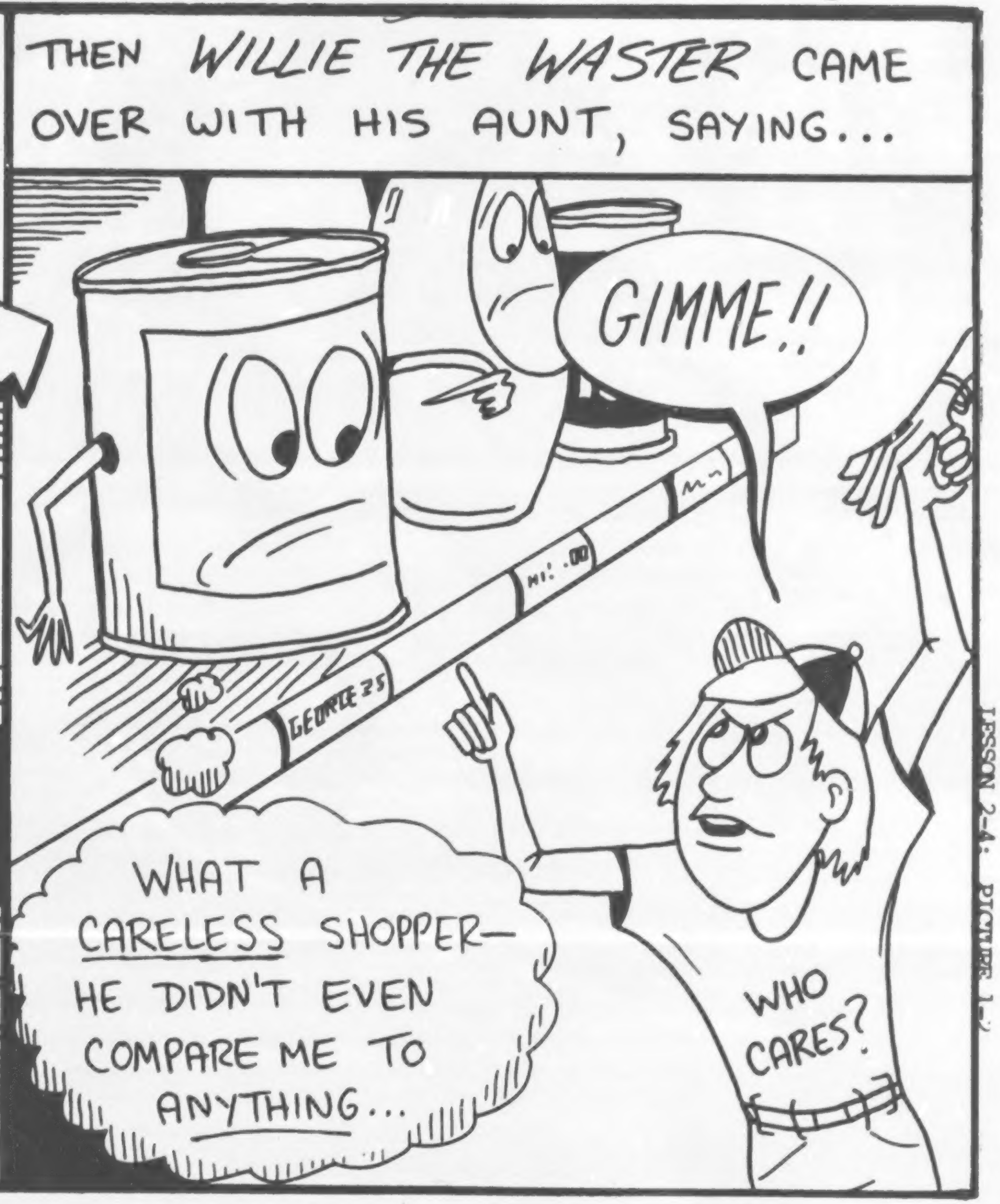
Disposer

1. Do I need to throw this away, or can I use it again?
2. Can this be recycled?
3. ____?


PRESENTING...
WILLIE THE WASTER
STARRING...
WILLIE
AND...
GEORGE THE CAN
IN....
WHO CARES?
BY PETT

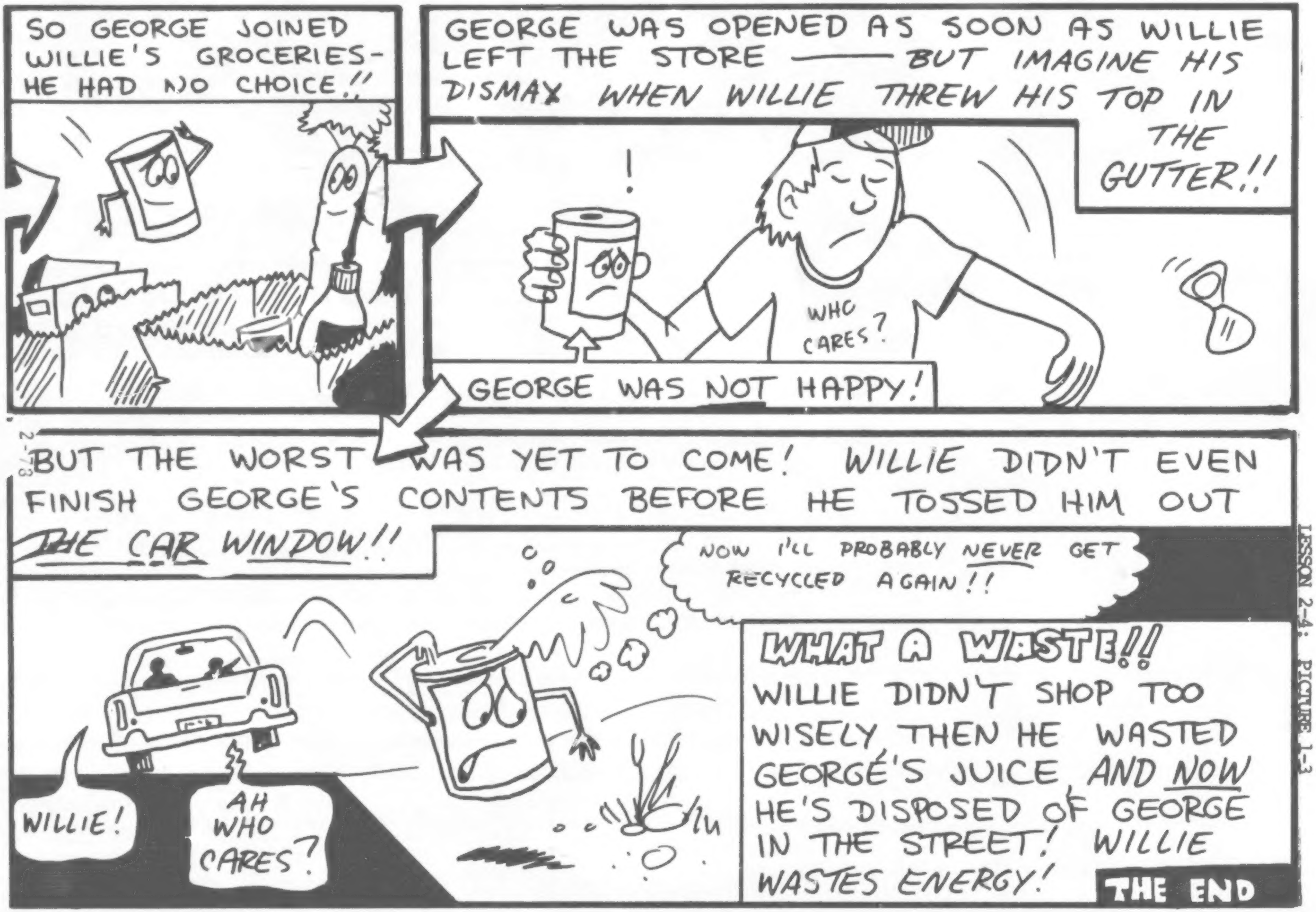

GEORGE THE CAN WAS VERY HAPPY. HE LIVED ON A SHELF, WAITING FOR SOMEONE TO BUY HIM AND TAKE HIM HOME.
2-77
YUM YUM
NEW!
OLA
GEORGE .25
NRG .78

279


THEN *WILLIE THE WASTER* CAME OVER WITH HIS AUNT, SAYING...
GIMME!!
GEORGE .25
WHAT A CARELESS SHOPPER— HE DIDN'T EVEN COMPARE ME TO ANYTHING...
WHO CARES?

280

LESSON 2-4. PICTURE 1.


SO GEORGE JOINED WILLIE'S GROCERIES- HE HAD NO CHOICE!!
GEORGE WAS OPENED AS SOON AS WILLIE LEFT THE STORE —— BUT IMAGINE HIS DISMAY WHEN WILLIE THREW HIS TOP IN THE GUTTER!!
!
WHO CARES?
GEORGE WAS NOT HAPPY!
BUT THE WORST WAS YET TO COME! WILLIE DIDN'T EVEN FINISH GEORGE'S CONTENTS BEFORE HE TOSSED HIM OUT THE CAR WINDOW!!
NOW I'LL PROBABLY NEVER GET RECYCLED AGAIN!!
WILLIE!
AH WHO CARES?
WHAT A WASTE!!
WILLIE DIDN'T SHOP TOO WISELY, THEN HE WASTED GEORGE'S JUICE, AND NOW HE'S DISPOSED OF GEORGE IN THE STREET! WILLIE WASTES ENERGY!
THE END

2-78

LESSON 2-4: PICTURE 1-3

LESSON 2-5: CONSERVING ENERGY PRODUCTS

Rationale

Students will learn about different ways of conserving energy and alternative uses of energy. They will apply their knowledge to a cartoon about "Carefully Consuming Carole" and then to their individual lives and to their community. This application will serve as a linkage between their knowledge and actions that they can take. They will learn basic ways in which they can conserve energy and develop habits of energy conservation that are essential to being effective energy actors.

Objectives

1. Students will see energy conservation as a high priority in their everyday lives. Teachers can assess the attainment of this objective through students' responses to Activity G in this lesson.

2. Students will apply their knowledge about energy conservation to their school or families and community. Teachers can assess the attainment of this objective through students' responses in Activity F and G of this lesson or through Assessment Activity Two at the end of this chapter.

Main Activity

A. Talk with students about how conservation is a basic way of dealing with the energy problem. Tell them that conservation involves changing lifestyles. Basically it involves doing one or more of the following things. First, it involves doing without some major energy products. Second, it involves cutting back on energy that one does use. Third, it involves finding energy alternatives. See if students can list ways in which they might do without energy as a way of conservation, cut back on energy, or find energy alternatives.

B. Now have students read the cartoon on "Carefully Consuming Carole" which is enclosed with this lesson. Carole is a consumer in the same way that Willy was a consumer in Lesson 2-4. The difference is that Carole is conserving where Willy is wasting. Carole is conserving in her roles as shopper, user, and disposer of energy products. Have students look at the cartoon and pick out instances where Carole decided to do without, cut back, or find alternatives as she was shopping in the grocery store with her Dad.

C. Have students develop Energy Conservation Questions for shopper, user, and disposer roles. The following questions might be used as guides although student questions also should be added.

Shopper

1. Can I do without this energy resource?
2. What is the amount I need to buy?
3. ____?

User

1. Do I need to use this energy?
2. Can I use something else?
3. ____?

Disposer

1. Can I use this energy again?
2. Can this energy be recycled?
3. ____?

Students should add questions in the third position in the Energy Conservation Questions.

D. Now discuss how the Energy Conservation Questions can be used in terms of some energy or energy products that students are currently using, such as lights, pens, paper, etc. Have them rate themselves on the Energy Conservation Questions in terms of that energy or energy products. Discuss energy conservation measures with the class and how they can be better energy conservers.

E. Now ask students to go shopping with their parents the next time that they go to the grocery store. See if they can do what "Carefully Consuming Carole" did in the grocery store. Ask them to take their energy conservation questions with them and to talk with you after they are finished about how well they did as energy conservers in going to the grocery store. The energy conservation questions are attached to this lesson.

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F. Have students select three major ways they think energy can be conserved in their school. Have them practice their evidence-gathering skills by collecting information about who is doing conservation and how much energy needs to be saved. Have them use their energy conservation questions to discuss these conservation habits with people in the school or bring people into the classroom and have students ask them these questions.

G. Help the students to make recommendations for energy conservation in their school. Be sure their recommendations are heard by relevant school decision-makers. Talk with them about how each of the recommendations is an important part of helping to ease the energy problem. Students should be able to list two or three reasons why their recommendations will make an important difference in the school. They should be able to list, for example, that the school will save money, or that there will be more energy for more school children.

Grade Level Adaptation

K-1: Find a story that students are currently reading that shows a person conserving something. Read the story to students and talk with them about how conservation involves doing without, cutting back, or finding energy alternatives. Then have students pick one activity where they think that they can make a difference in conserving energy.

4-6: Have students find examples in magazines and newspapers of energy conservation in terms of doing without, cutting back, and finding energy alternatives. Then have them do a survey of their school and discuss ways in which they can save energy. Be sure that their recommendations are given to appropriate school authorities.

Language Arts Adaptation

K-1: Help students to learn about conservation through the use of puppets. Have students use puppets in order to show activities in which people are conserving energy.

2-3: Have students develop some dialogue between themselves and Carefully Consuming Carole. They might want to write it out or to spell words as they have a dialogue with someone who is asking questions about conservation and someone who is concerned about using energy.

4-6: Ask students to write a story about a conservation character other than Carefully Consuming Carole. You will want them to use language arts skills you are teaching in writing their stories. Have them read their stories aloud to the class.

Math Adaptation

K-1: Help students to sort into three categories pictures of energy products that are eaten, that are used, and that people other than themselves use. This will help students with basic sorting techniques.

2-3: Have students list all the ways in which they think that they can conserve energy products in their class or their school by doing without, cutting back, or finding energy product alternatives. Students can count the number of items that fall into these categories. They can practice addition, subtraction, multiplication, or division.

4-6: Have students do graphs or charts or other math functions using the data they collect about conservation in their study of their school.

ENERGY CONSERVATION QUESTIONS

Shopper

1. Can I do without this energy resource?
2. What is the amount I need to buy?
3. ____?

User

1. Do I need to use this energy?
2. Can I use something else?
3. ____?

Disposer

1. Can I use this energy again?
2. Can this energy be recycled?
3. ____?

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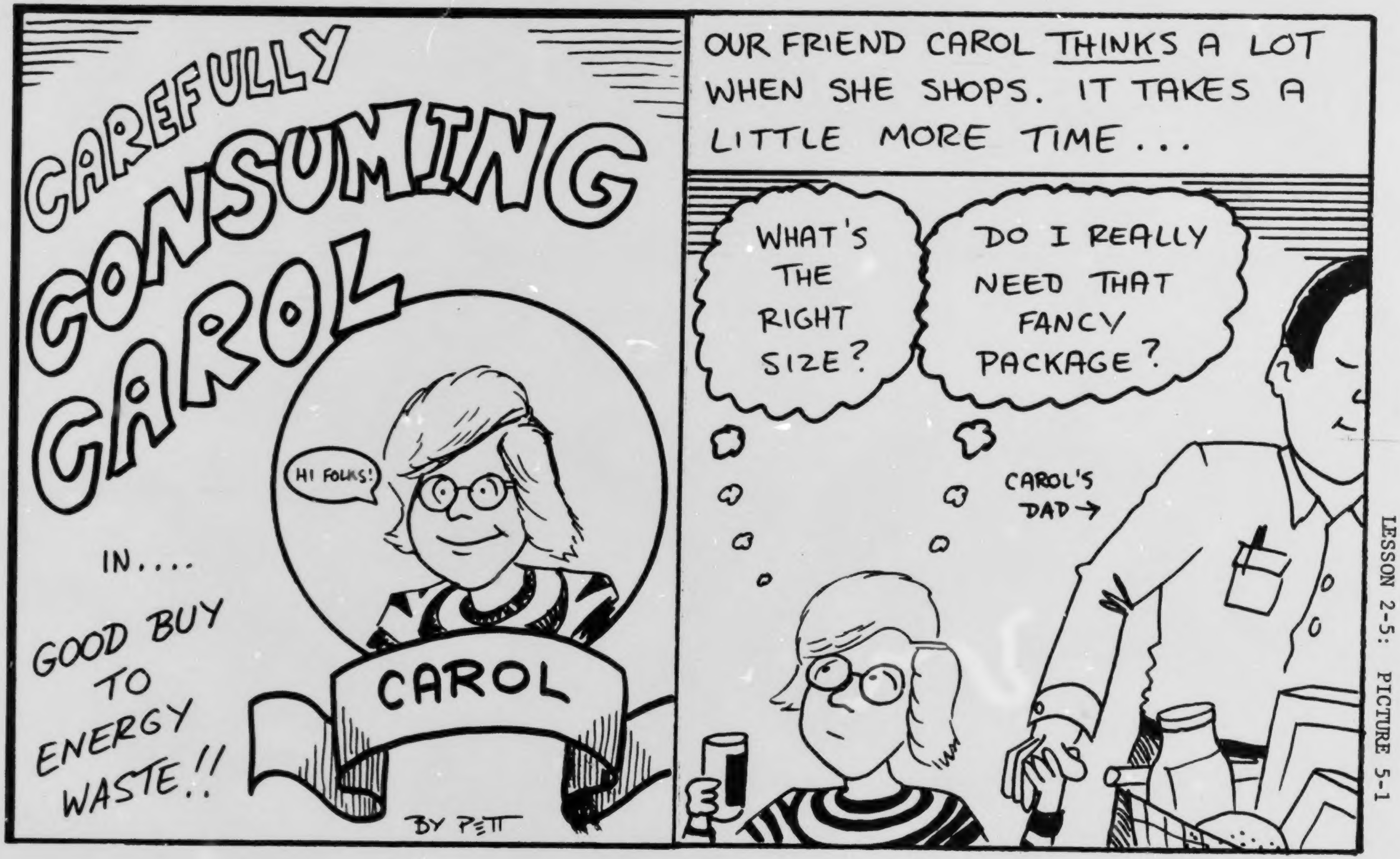
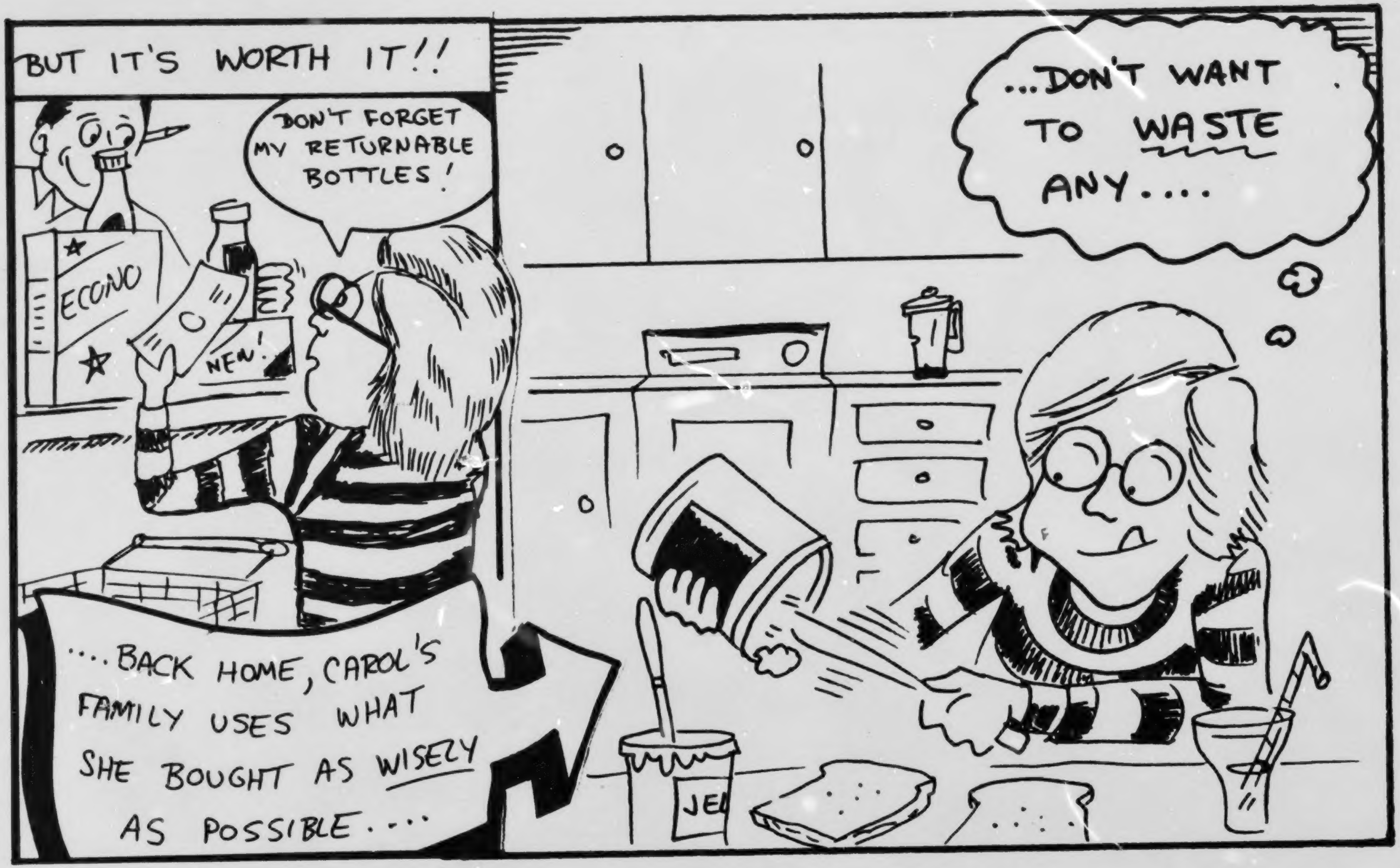
2-84


CAREFULLY CONSUMING CAROL
HI FOLKS!
CAROL
IN....
GOOD BUY TO ENERGY WASTE!!
BY PETT
OUR FRIEND CAROL THINKS A LOT WHEN SHE SHOPS. IT TAKES A LITTLE MORE TIME...
WHAT'S THE RIGHT SIZE?
DO I REALLY NEED THAT FANCY PACKAGE?
CAROL'S DAD →

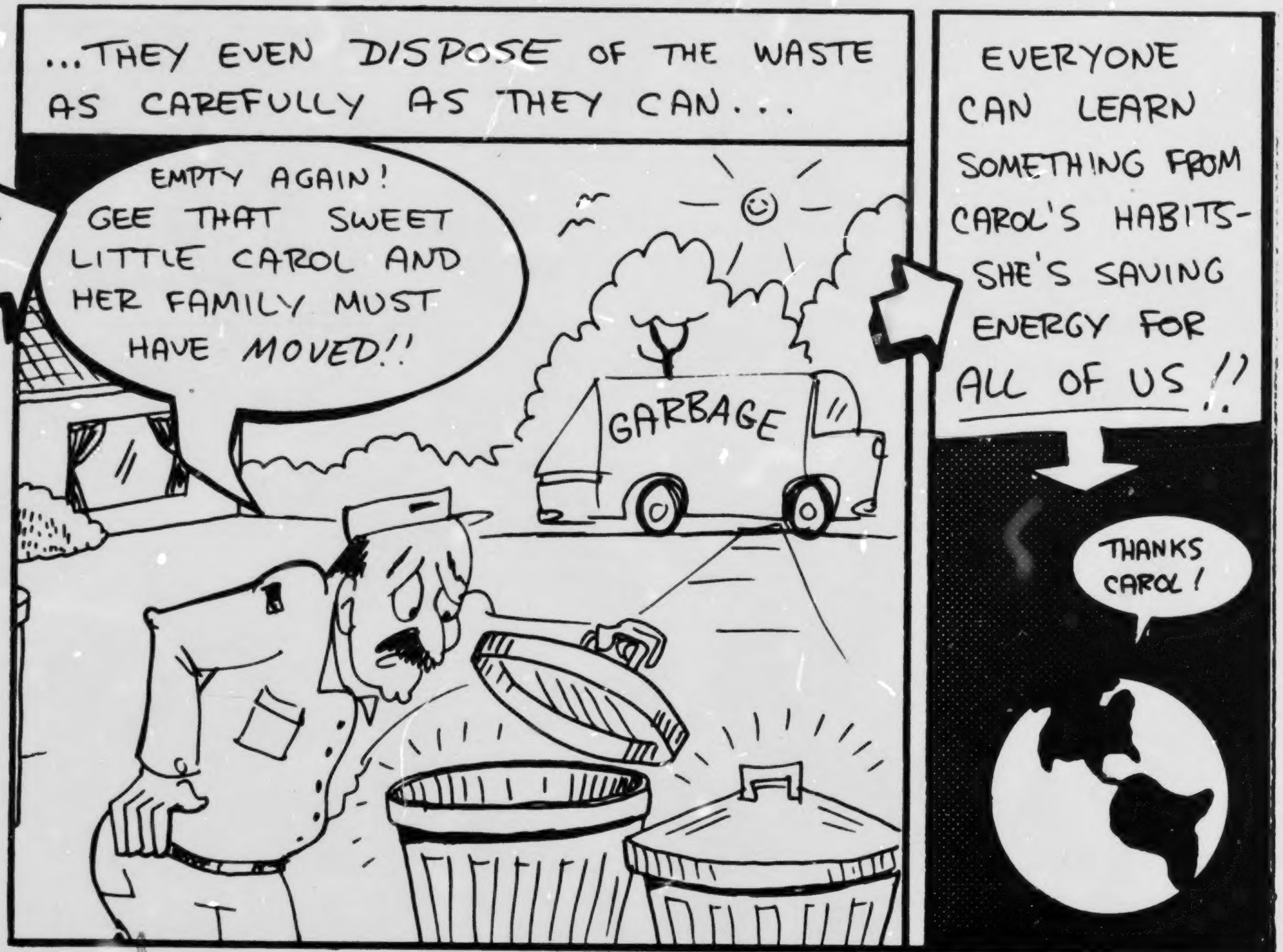
LESSON 2-5: PICTURE 5-1

2-85


BUT IT'S WORTH IT!!
DON'T FORGET MY RETURNABLE BOTTLES!
ECONO
NEW!
....BACK HOME, CAROL'S FAMILY USES WHAT SHE BOUGHT AS WISELY AS POSSIBLE....
...DON'T WANT TO WASTE ANY....
JE

LESSON 2-5: PICTURE 5-2

2-86


...THEY EVEN DISPOSE OF THE WASTE AS CAREFULLY AS THEY CAN...
EMPTY AGAIN! GEE THAT SWEET LITTLE CAROL AND HER FAMILY MUST HAVE MOVED!!
GARBAGE
EVERYONE CAN LEARN SOMETHING FROM CAROL'S HABITS- SHE'S SAVING ENERGY FOR ALL OF US!!
THANKS CAROL!

LESSON 2-5: PICTURE 5-3

LESSON 2-6: ENERGY USE AROUND YOU

Rationale

The purpose of this lesson is for students to apply the ideas about energy use which they have learned from this chapter. They will practice their evidence-gathering skills by determining ways in which energy use across the world affects them, and will develop arguments that they can use to convince other people that energy conservation is necessary.

Objectives

1. Students will apply their evidence-gathering skills. Assessment of this objective can be made by students' responses in Activity A of this lesson.

2. Students will practice their consumer roles in trying to convince others that energy conservation is important. Assessment of this activity can be made by students' responses to Activity E in this lesson.

Main Activity

A. Discuss with students the lists they have formed of their own conservation and waste of energy. Re-create the list on the blackboard, and have students gather evidence about who else does the same things they do--how other people in their town, their families, people in their school use much of the same energy that they use. When students have finished gathering their evidence, have them discuss how important it is not only that they themselves find ways of energy conservation, but that they influence others to conserve energy.

B. Ask students to develop a dialogue or set of arguments that they might use to convince someone else to waste less energy, or to conserve more energy. Have them focus on their consumer roles, as shoppers, users, and disposers of energy. They might want to convince someone to shop more carefully, or to use more energy more carefully, or to dispose of it differently. Have them develop at least three convincing points that they would make to another student, or to someone in their families or community about the use of energy.

C. Then have students divide into pairs in the class and try to convince other students of their position. Have them try out their arguments orally, and then talk with the class about students' successes and failures in convincing their classmates. Give them useful advice about how they might be more convincing in talking to other people.

D. Help students to develop a plan to, either individually or as groups, influence other people to conserve more energy. Have them state their objectives and what they would do to influence the person and what the outcomes might be. Then have them carry out their plan. Be sure that students keep their logs, or other record of their activities, so that they can report back to class.

E. Ask students to report on the successes and failures in their attempts to try to influence someone else to conserve energy. Use the following questions as a basis for class discussion:

1. Who did you try to convince about the energy problem?
2. In what ways were you successful in convincing them?
3. In what way did you not succeed in convincing them?
4. What do you think the results of your action may be?
5. Who else might you try to convince about conserving energy?

Grade Level Adaptation

K-1: As a class, have the students try to convince you to conserve something they think is important. Have them do it as a class and then review with them ways in which they tried to convince you to be a better energy consumer.

4-6: Have students divide into groups and try to convince other groups in the school to try to conserve on energy. For example, they might try to convince the student council to turn off half the lights in the meeting room. Then have them write a group report about their experience and other ways that the group they have studied might conserve on energy.

Language Arts Adaptation

K-1: Have students use puppets to try to practice ways of convincing someone else that he or she needs to conserve energy.

2-3: Have students take turns in reading aloud a story that indicates ways that things can be conserved.

4-6: Ask students to write a dialogue between two people in which one is using the best convincing strategies that he or she can think of in order to get the other person to conserve on energy.

Math Adaptation

K-1: Help students to count the people that they know they might influence to conserve energy. Help them see that as a class the number of people that they might influence would be considerable.

2-3: Teach students the concept of "twice". In convincing someone else to conserve energy they will double the number of people (there will be twice as many people) conserving it.

4-6: Have students practice multiples by determining how many people they might impact with their conservation strategies. If, for example, they try to convince the student council, they will have a multiple of perhaps twenty or thirty students times themselves--the students who are carrying out the activity. You can use these methods to teach students basic multiplication.

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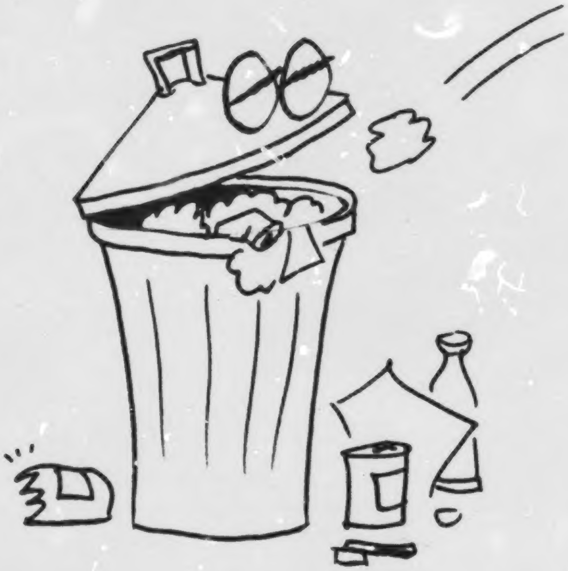
CHAPTER TWO: ASSESSMENT ACTIVITIES

The assessment activities in this chapter are designed to evaluate students' understanding of ways of wasting, conserving, and using alternative forms of energy. Students should be able to understand these ideas and to give specific examples of how they are carried out on an everyday basis.

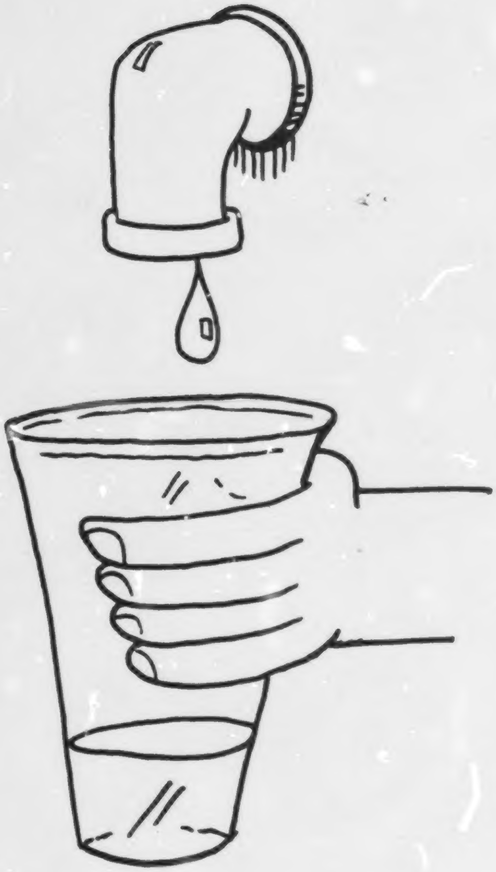
Assessment Activity One. This assessment activity reviews wasting, conserving, and using alternative forms of energy. The students need to match the ideas with specific ways in which energy is used. The key for this matching activity is found on the page after the exercise.

Assessment Activity Two. In this assessment activity, students fill in the sentences in the story. They see how one carries out conservation by doing without something, cutting back on it, and using energy alternatives. The key for the words that belong in the sentences is enclosed on the page following the assessment activity.

These assessment activities can be used in conjunction with individual lessons in the chapter or at the end of the chapter as a review. Assessment Activity One pertains to lessons 1, 2 and 3. Assessment Activity Two pertains to lessons 4, 5 and 6.



Ⓐ ____________________



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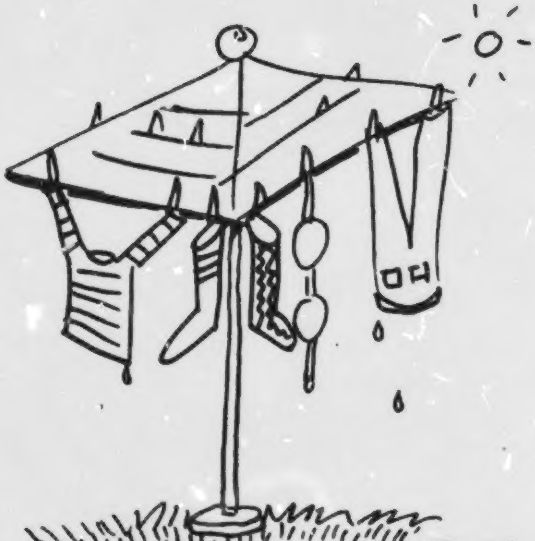
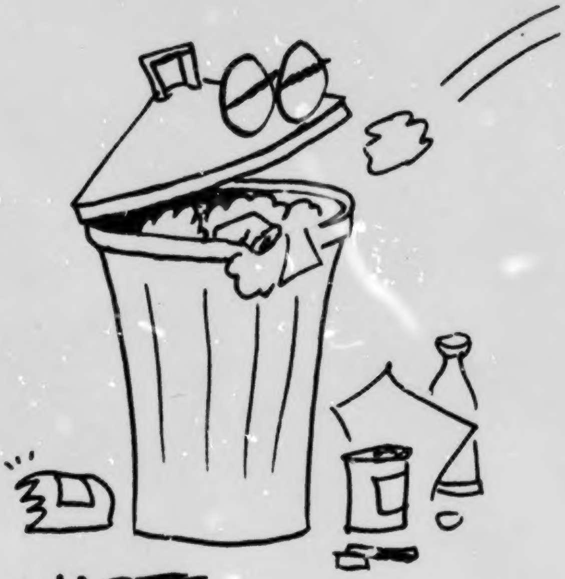
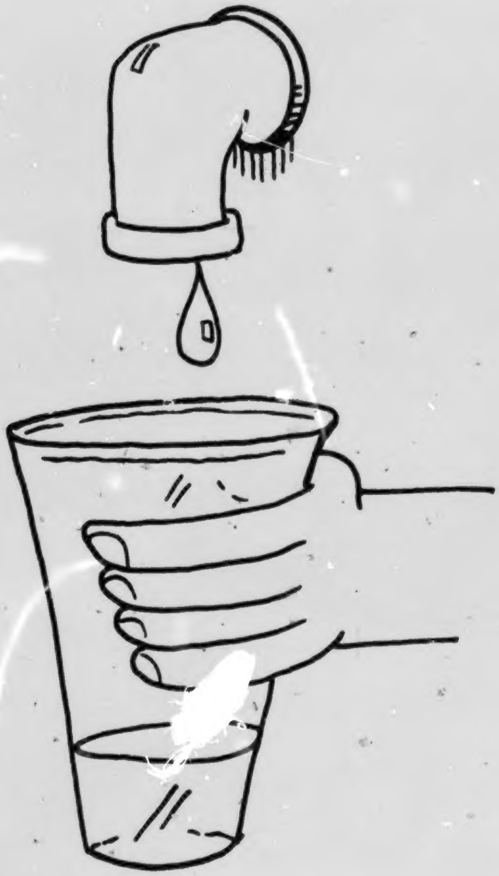

PETT

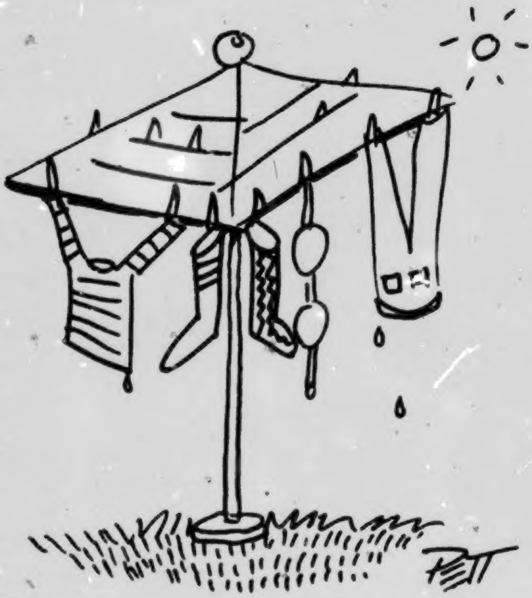
Ⓑ ____________________



Ⓐ WASTE

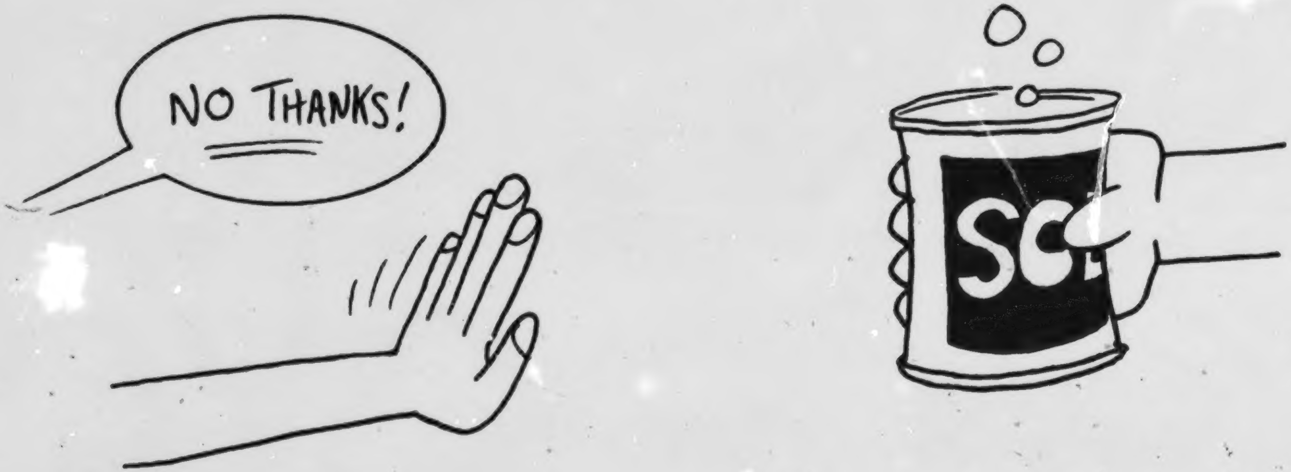


Ⓒ SAVING

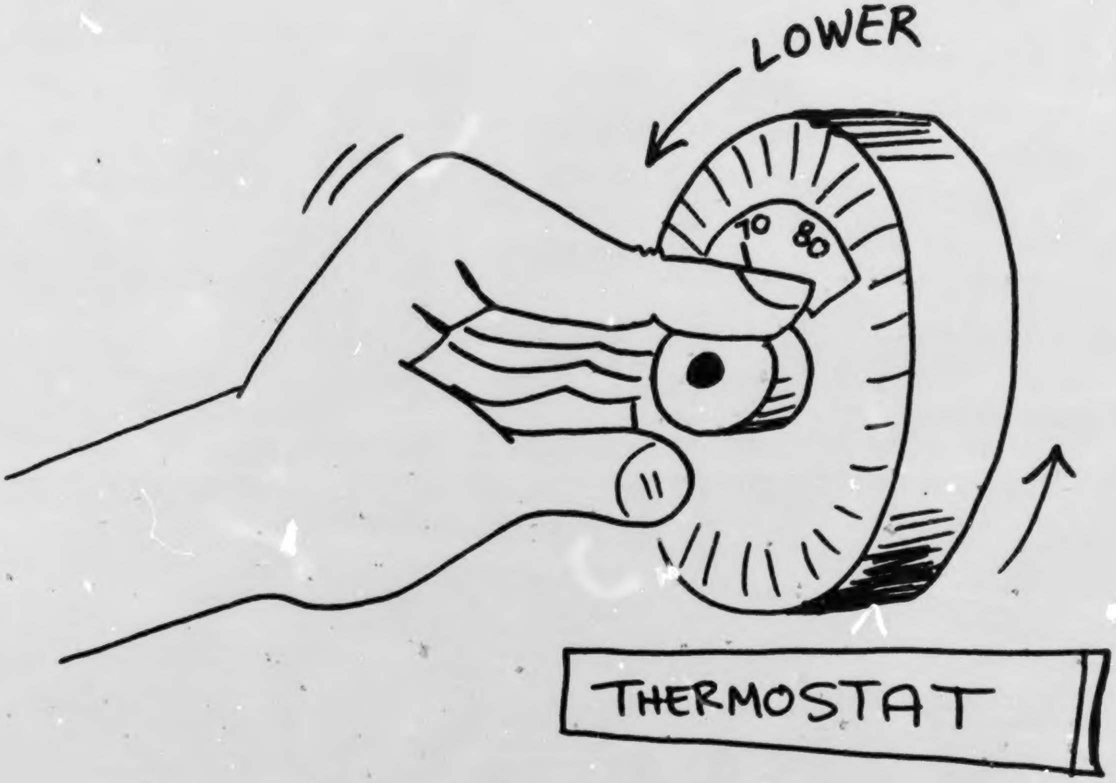


Ⓑ ALTERNATIVE

THERE'S MORE THAN ONE WAY TO CONSERVE ...



...YOU CAN DO ______________ SOME THINGS...
(HIOUTTW)

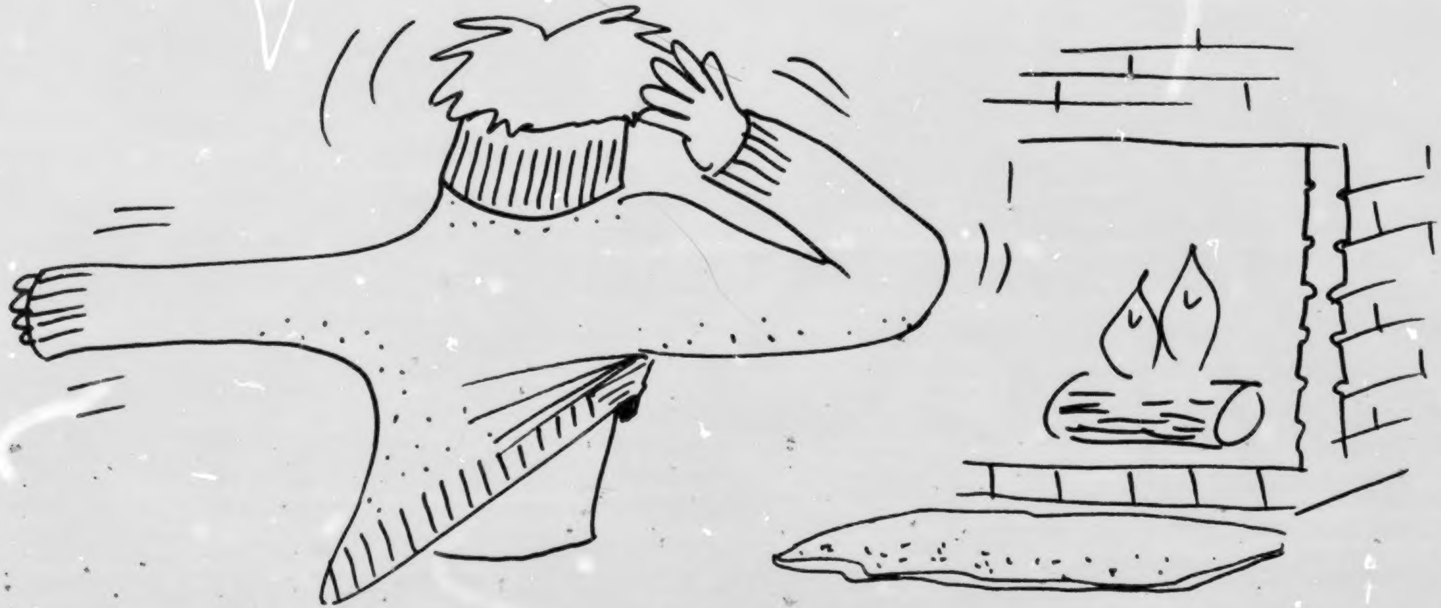

LOWER
70
80
THERMOSTAT

...YOU CAN ______ ______ ON OTHERS...
(TCU KBCA)

... AND, YOU CAN FIND A BETTER WAY,

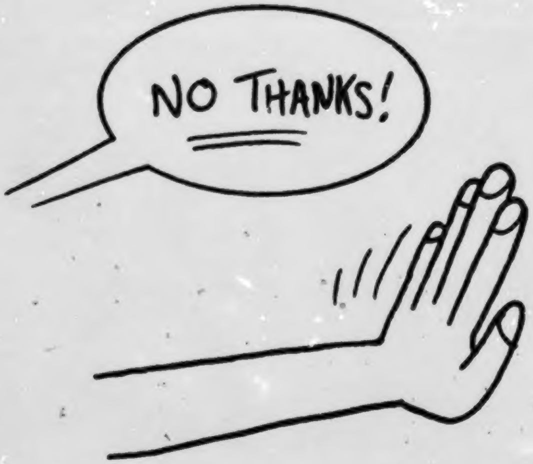
IN OTHER WORDS AN ________________.

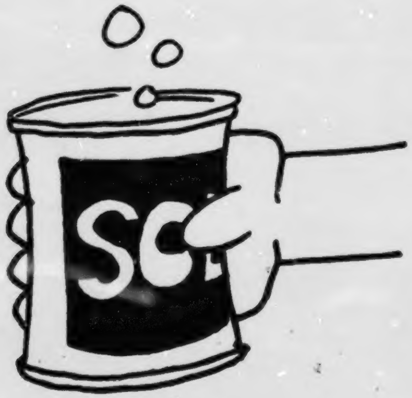
(LTARENTVAEI)



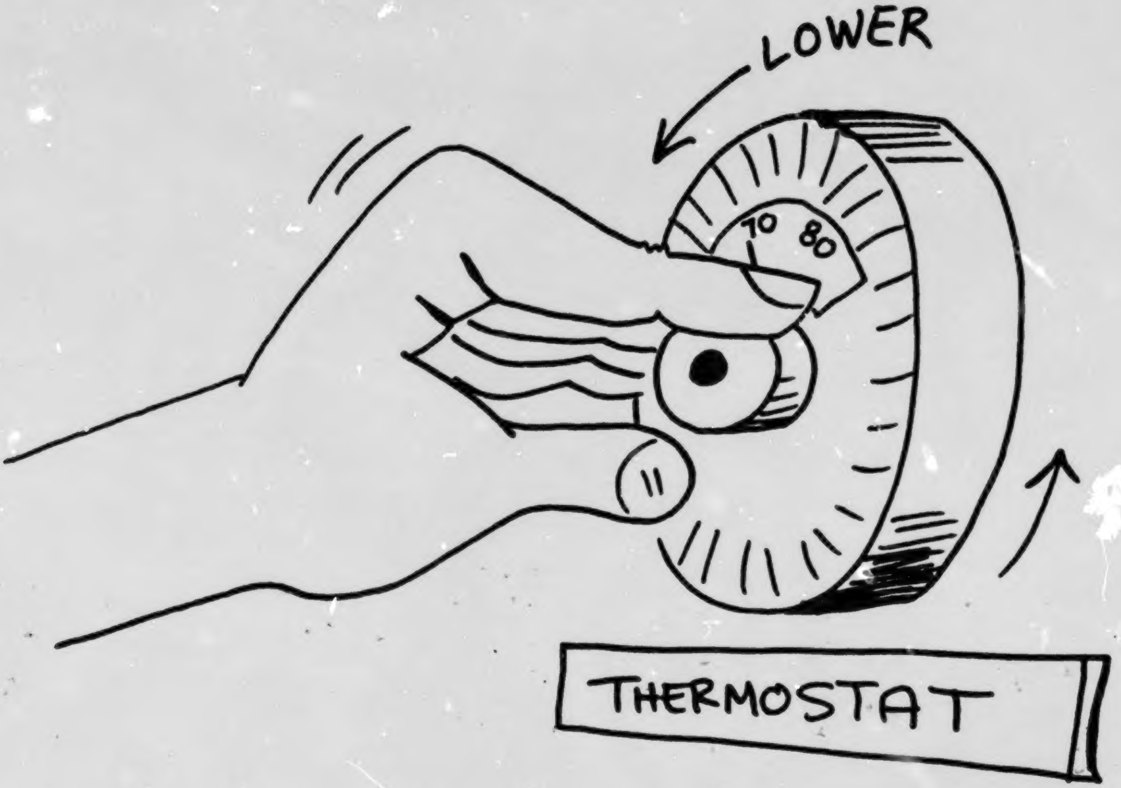
..THERE ARE LOTS OF WAYS TO SAVE !'

THERE'S MORE THAN ONE WAY TO CONSERVE ...





...YOU CAN DO WITHOUT SOME THINGS...
(HIOUTTW)

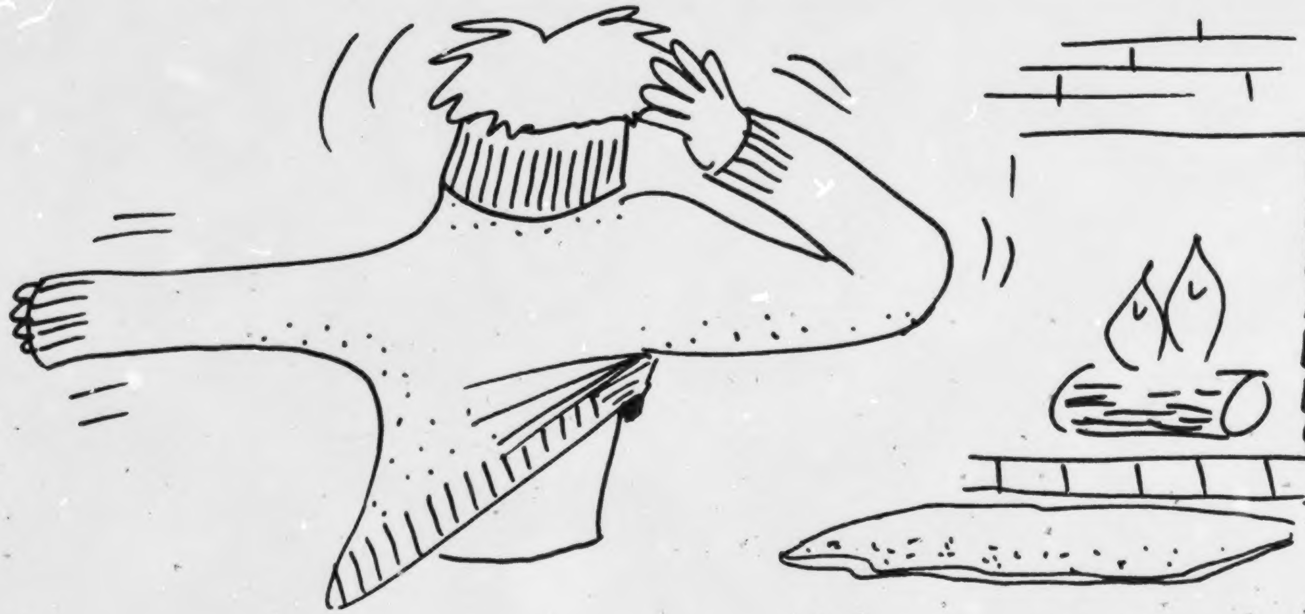

LOWER
70
80
THERMOSTAT

...YOU CAN CUT BACK ON OTHERS...

(TCU KBCA)

... AND, YOU CAN FIND A BETTER WAY, IN OTHER WORDS AN ALTERNATIVE.

(LTARENTVAEI)



...THERE ARE LOTS OF WAYS TO SAVE!'

CHAPTER 3: ENERGY HABITS

Rationale

This chapter teaches students about habits or patterns of energy use. They have learned about how individuals use energy and energy products. It is as important to understand how the total pattern of energy use makes a difference. Students will learn how their own habits or patterns make a difference in the total distribution of energy resources.

Lesson 1 will focus on making students aware of habits of energy use. They will see that their use of energy is not just an isolated act, but one which, combined with other activities of other individuals, makes a pattern which makes a bigger difference than their individual actions. In Lessons 2 and 3, students will learn about energy habits of lots of people and groups. They will see how patterns make a big difference in the energy problem.

In Lessons 4 and 5, students will study their homes and school and how patterns of energy usage across their community make a difference. Students will then have the opportunity to try to change energy distributions by changing their own habits and those of their community. They will practice important evidence-gathering and decision-making skills, as well as consumer roles.

Objectives

1. Students will become aware of their own habits of energy use. (Lesson One)
2. Students will become aware of their own good and bad habits as energy consumers. (Lesson Two)
3. Students will learn how they can act to change their energy habits. (Lesson Two)
4. Students will become aware of groups that practice energy consumer habits. (Lesson Three)
5. Students will learn how they can change energy habits in groups. (Lesson Three)
6. Students will apply their knowledge of energy habits and ways to change them to situations in their homes and school. (Lesson Four)
7. Students will apply their knowledge of energy habits in their community and how to change them to actual groups and settings. (Lesson Five)
8. Students will show concern for changing energy habits. (Lesson Six)
9. Students will practice evidence-gathering and decision-making skills in changing energy habits. (Lesson Six)

LESSON 3-1: HABITS OF ENERGY USE

Rationale

The purpose of this lesson is to help students to become aware of their own energy habits and those of others. They should be able to see how a habit is a pattern of activity like getting up in the morning and going to school. They should also see that if many people have the same habit, then they have much more impact on a problem than if only one individual acts.

Objectives

Students will become aware of their own habits of energy use. Teachers can assess the attainment of this objective through students' pictures in Activity D of this lesson.

Main Activity

A. Teach students about the idea of a habit. Help them to make a list of all the habits that they have every day. They get up in the morning. They come to school, they go home, they eat dinner. All of these are well-established habits. They are habits because they are a routine or because they are done daily or weekly. Going to church is an example of a habit that many people practice weekly.

B. Now have students outline their energy habits. Have them speculate about different kinds of good energy habits that they might have such as turning off lights, recycling bottles or cans, turning down the air conditioner. Have them make a list of the ten most important energy habits that they think people could have. They should think about their roles as effective energy consumers and how they might practice their habits on a daily or weekly basis. Save this list so that students can refer to it throughout this lesson and throughout the year.

C. Take one of the habits students have listed on the board or on a sheet of paper. Ask them what difference they think it will make if all of them do it rather than just one of them. Use the graphs that are attached with this lesson or draw a series of graphs that show the differences in energy consumption depending upon whether one person does it, most people do it, or everybody does it. Talk with them about how getting everyone to have good energy habits will make a tremendous impact on the energy problem. You may want to illustrate this activity with one particular energy product such as gasoline.

D. Have students draw their own pictures about one energy habit that they have. Have them explain to you what the habit is and how they practice it daily or weekly.

E. Invite someone to visit the class who is from a group that is trying to do something about some aspect of the energy problem. Have the person talk with students about how when people get together they make more of an impact than a single individual. Then hold a discussion with students using the following questions:

1. What is a habit? (e.g. a pattern of activity, something that we do daily or weekly)

2. What are some good energy habits? (e.g. turning off lights, using less paper)

3. Why are good energy habits important? (e.g. We will save energy; we will save money.)

Grade Level Adaptation

K-1: Talk with students about good habits that they have. Have them map out some of those good habits for the class. Then talk about good energy habits. Have students draw pictures of the energy habits that they think are the best energy habits that they could have.

4-6: Have students identify the ten best energy habits that they can think of. Have them do a survey of their class or their school or another class to determine how many people actually do these habits. Then have them calculate several math functions using their data.

Language Arts Adaptation

K-1: Read a story to students about someone's habits. Have students identify the habits and talk about why they are good habits.

2-3: Help students to list in sentences what they think are the ten best energy habits.

4-6: Have students write a story about their own energy habits or about one particular habit that they think is important.

Math Adaptation

K-1: Have students count the number of times they do one thing during the day or a week. Talk about what a habit means in terms of a mathematical measure.

2-3: Help students to do a survey of their class or their friends, identifying people with different energy habits. Help them count the number of people who do each habit.

4-6: Have students draw graphs with different sizes of groups showing various distributions of good energy habits.

LESSON 3-1: PICTURE 1-1

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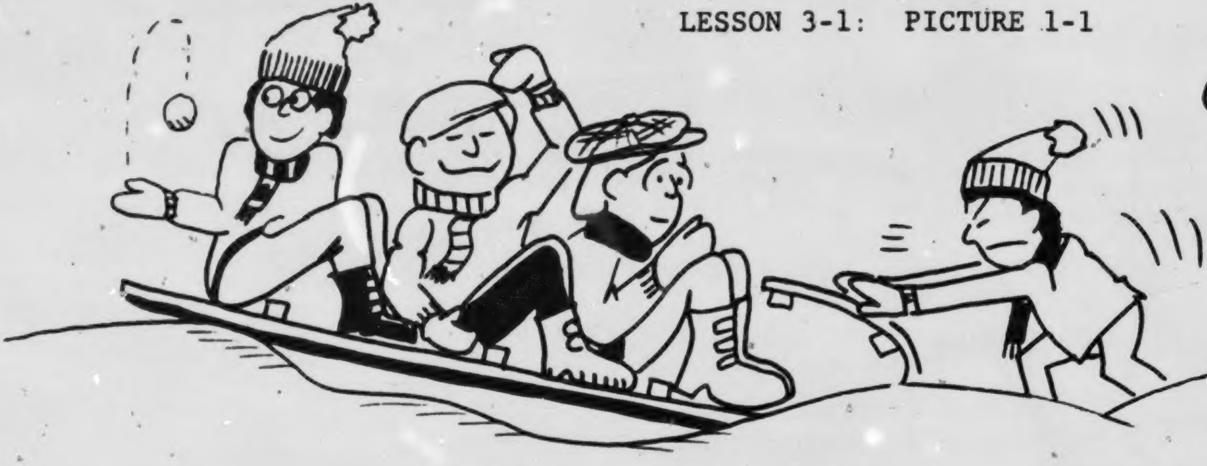

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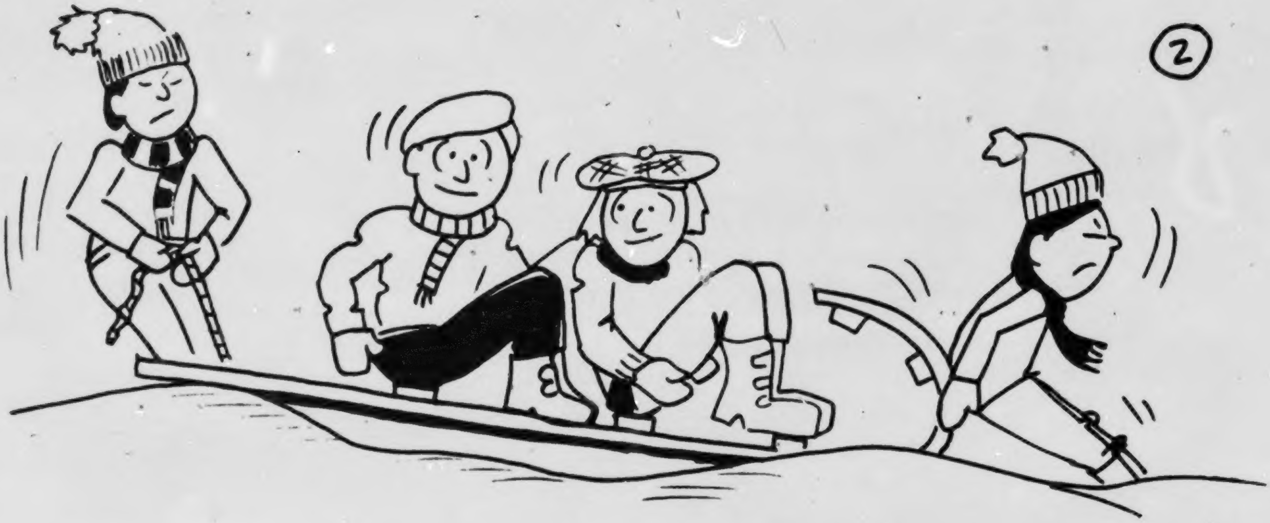

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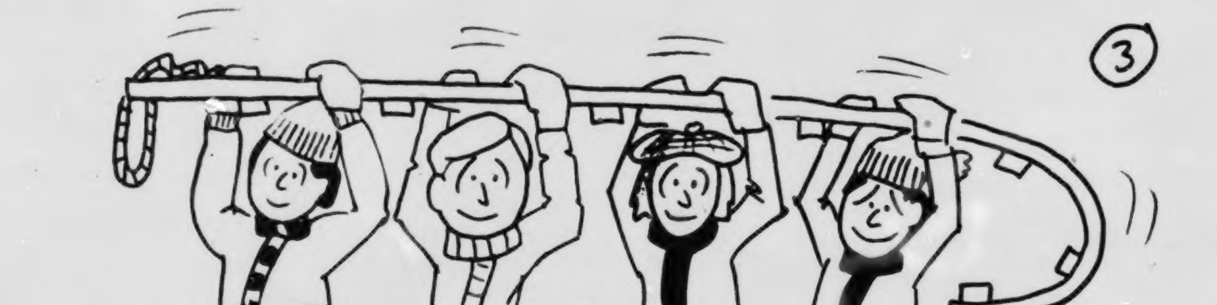


LESSON 3-2: PEOPLE'S ENERGY HABITS

Rationale

This lesson is designed to show students good and bad habits of energy use. Students will see how they can change bad habits to good habits and practice some ways of changing their own energy habits as well as those of others.

The skill of changing habits is taught here. It is one of the most important participation skills involved in being an effective energy actor. If we cannot effectively change our habits, our knowledge will do us very little good.

Objectives

1. Students will become aware of their own good and bad habits as energy consumers. Assessment of this objective can be done by analyzing student responses to Activities A and B.

2. Students will learn how they can act to change their energy habits. Assessment of this objective can be done by student responses to questions in Activity D or by Assessment Activity 1 at the end of this chapter.

Main Activity

A. Students have seen how they perform consumer roles in the energy situation and have seen how people can waste or conserve energy. They have also made a list of the "good habits" they might develop as energy users in the previous lesson. Students should review the essential aspects of their roles as energy consumers and talk about how their good habits fit into the categories of shopper, user, and disposer of energy.

B. Begin the new information in the lesson by having students develop a list of the five or ten worst energy habits that they can think of. This will be the "bad habit" list. Students should reflect on their own lives and what bad energy habits they have and the people around them have. This list should be put up next to the list of good habits that they have made in the previous lesson.

C. Now that students have listed their good and bad energy habits, the question is how we can change bad habits to make them good habits. Point out to students that changing a habit is not an easy thing to do. Have them take one of their bad habits, and talk about how hard it would be to change it. Perhaps they do not clean up their room, or they do not get along with their sisters or brothers, or they eat junk food all the time. These types of habits can be changed, but it is difficult.

D. Work with students in developing four types of ways that bad energy habits can be changed into good energy habits. The pictures and/or the cases enclosed with this lesson can be used to illustrate four ways that habits can be changed. They are: reward, punishment, convincing someone, leading someone.

If you use Pictures 2-1 through 2-4, talk with students about each of these four methods of changing bad habits to good habits. Have them draw examples from the lists they have of bad and good energy habits. The pictures illustrate the following.

2-1:	Shows a girl being rewarded for changing a bad habit by turning off lights.
2-2:	Shows a boy being punished in order to change a habit of not closing the door.
2-3:	Shows a father convincing his son to change a habit by wearing a sweater so the heat can be turned down.
2-4:	Shows a mother leading her son to change his habit by riding his bike instead of using the family car.

If you use the cases that are enclosed with this lesson, you might divide the students into groups to read the cases, have them read aloud in class, or have students read them individually. Then guide a discussion asking the following questions.

1. What method of changing bad to good habits is illustrated here? (i.e. reward)
2. Why is it difficult to change bad to good habits in this case? (i.e. People like the old ones.)
3. What happens if we change bad to good energy habits? (i.e. We are happier, we save energy.)

E. Discuss with students the possible impact it can have if bad habits of the energy problem are changed to good habits by individuals. Talk with students about how changing habits helps to change entire patterns of energy use. Therefore, for example, if everyone changed a bad habit of not turning off the lights to a good habit of turning them off, the following types of impact could be felt: 1) everyone could save money which they could use for other things; 2) everyone could help the local, state, and national situation, and therefore there would be more energy for those who need it; 3) everyone would be happier because the world would be a better place to live, and there would be less tension and conflict over energy resources; 4) people would be taking leadership in something which was important to everyone.

F. Have the students divide into pairs. Have them talk about one habit that they themselves can change from a bad habit to a good habit. Have each pair of students list a bad habit and then try to change it. They should work with another student who will monitor their progress and help them to change it.

G. Have the students report back to class either orally or in written essays about their changes in their energy habits. Have them talk about the impact that this can have on the energy situation.

Grade Level Adaptation

K-1: Use the pictures and have students use one method for changing habits where you or their parents can help them.
4-6: Have students read the stories. Ask them to practice and to do a report on each of the four ways they practice changing their habits.

Language Arts Adaptation

K-1: Have students act out the ways of changing habits.
2-3: Have students make a larger list of good and bad habits. You may want to teach them to spell the words and have a kind of spelling bee where students spell a word that is a good or bad habit and give an example of it.
4-6: Have students write a dialogue or an essay on one way they changed a habit from bad to good, or could change a habit from a bad one to a good one, or had trouble changing a habit.

Math Adaptation

K-1: Ask students to compare who in the pictures is wasting more or less energy.
2-3: Have students count the habits on the list they have made. Also, they may want to work with the clock in counting the number of hours, minutes or days in which they practice the habit.
4-6: Have students do graphs of different good and bad habits in groups of individuals. You may want to do a survey of the class and have them work with the data, depending on what particular math function you are teaching at this time.

SALLY'S REWARD

Sally is a third-grader in Center City. She is active in a lot of sports with her friends. She is so active that she has a hard time getting enough sleep. She often cannot get up in time to catch her bus. Her mother and father drive Sally to school.

Sally also really likes to go out to dinner. She often does that with her parents. She enjoys having a meal out with them.

Sally's mother and father were tired of taking her to school. They had an idea. They told Sally that, if she would get up in time to walk to school every morning for a week, they would go out to dinner on Friday.

Sally thought it was a good idea to go out to dinner. She liked that. Getting up was a hard thing to do. Sally's mother bought an alarm clock. Sally started to get up early. The first few mornings it was very hard, but she started thinking about the dinner her family would have Friday.

After a week of walking to school, Sally began to like it. She walked with her friends. She had more time to talk with them before school started. She also went out to dinner with the family and she enjoyed it.

SAM'S PUNISHMENT

Sam was a fourth-grader in Newton. He liked television. As soon as Sam came home from school, he always turned on the television. He watched it until dinner. Then he watched it until bedtime.

The only thing that Sam did other than watch television was play ball. He really loved going to practice with the other boys in his third-grade class.

Sam's parents did not want him to watch television. They knew the television used a lot of energy. They asked Sam to watch less television. But Sam could not. He had watched television for too long.

One day Sam's parents said that he should only watch two hours of television each day. If he did not, they would not let him go to ball practice.

Sam was unhappy. He wanted to play ball. He missed two games. He started watching less television. He found that he had many other things to do. He enjoyed playing ball. He liked riding bikes with his friends. Now, Sam does not watch television. He plays ball with his friends.

SUSIE'S PAPER PLAN

Susie was a first-grader in Davis City. Her parents were worried about the energy problem. Susie worried too. They always put their newspapers in a stack. Then they took them to a place where they could be used again to make new paper. This way, not so many trees were cut. Wood, a valuable resource, was saved.

Susie did not see any reason why they could not recycle paper that they used at school. They used a lot of paper to do lessons, art work, and other things. All they would need to do would be to put it in a pile, and get students to recycle it by using the other side.

Susie talked with her teacher. The teacher thought it was a good idea. They then talked to the class. The class also thought it was a good idea. The first-grade class stacked all of their waste paper into one place. When they needed to draw a picture they took out a piece of paper and used the other side.

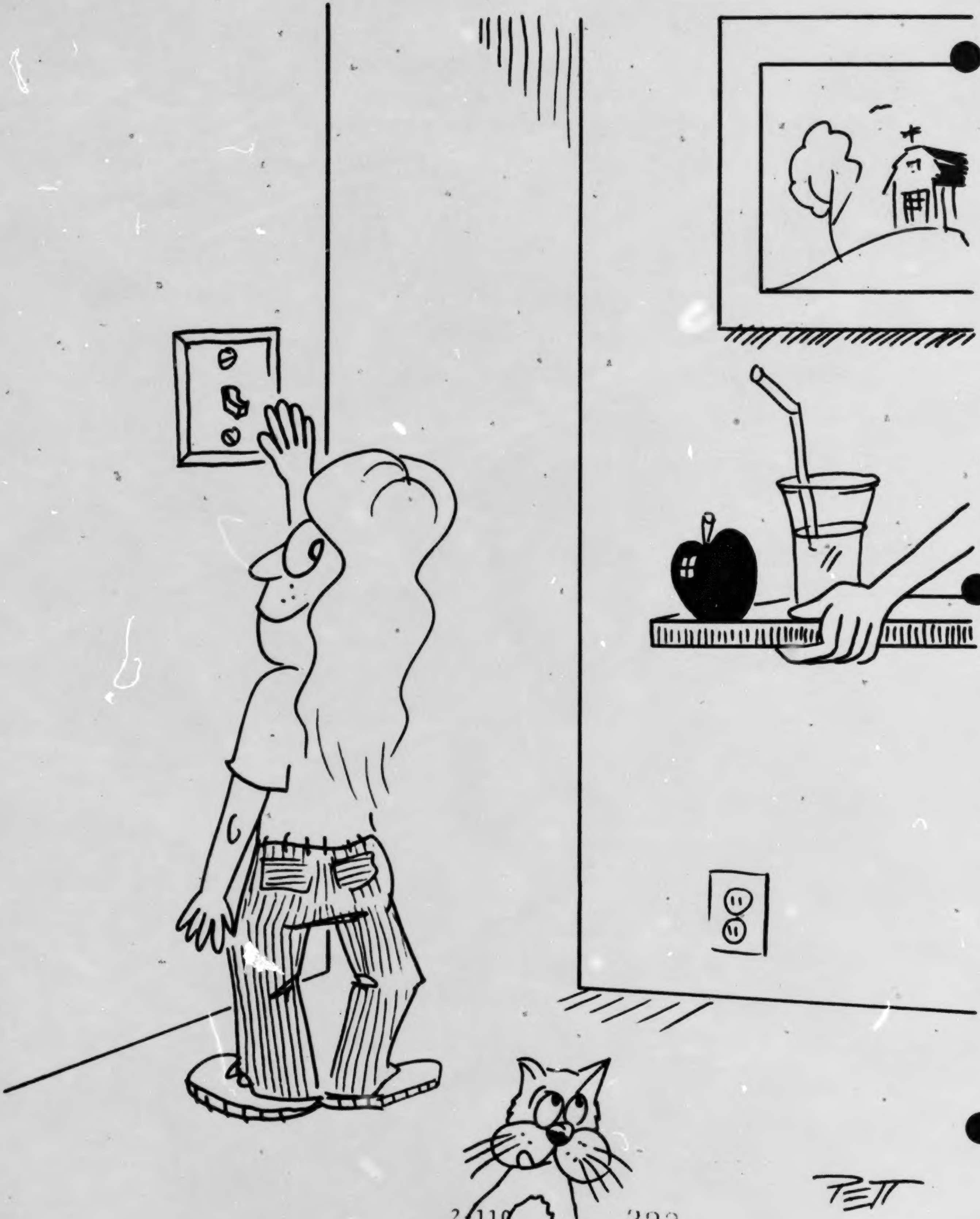
They saved energy. Other classes began to do the same thing.

JIMMY'S LEADERSHIP

Jimmy was a third-grader at Sydney. He was concerned about the plastic products that were used in the community. Plastic products were made from oil. He did not know how to go about getting people to use other types of containers than plastic ones.

Jimmy talked with his father. His father said that he might form a group of people in the community who would go door-to-door and talk about the problem of plastics. Jimmy thought that he could try to get people to use paper milk cartons rather than plastic bottles.

Jimmy organized a group of students in the third-grade class. They decided to choose one neighborhood in order to go door-to-door and talk with people about plastic milk bottles. They thought about what they would say. They would also try to get the local newspaper to do a story about their project. The newspaper article helped a lot of people to find out about plastic milk bottles. Jimmy's leadership went beyond his own local block. Soon the whole community was more conscious of the use of plastic products.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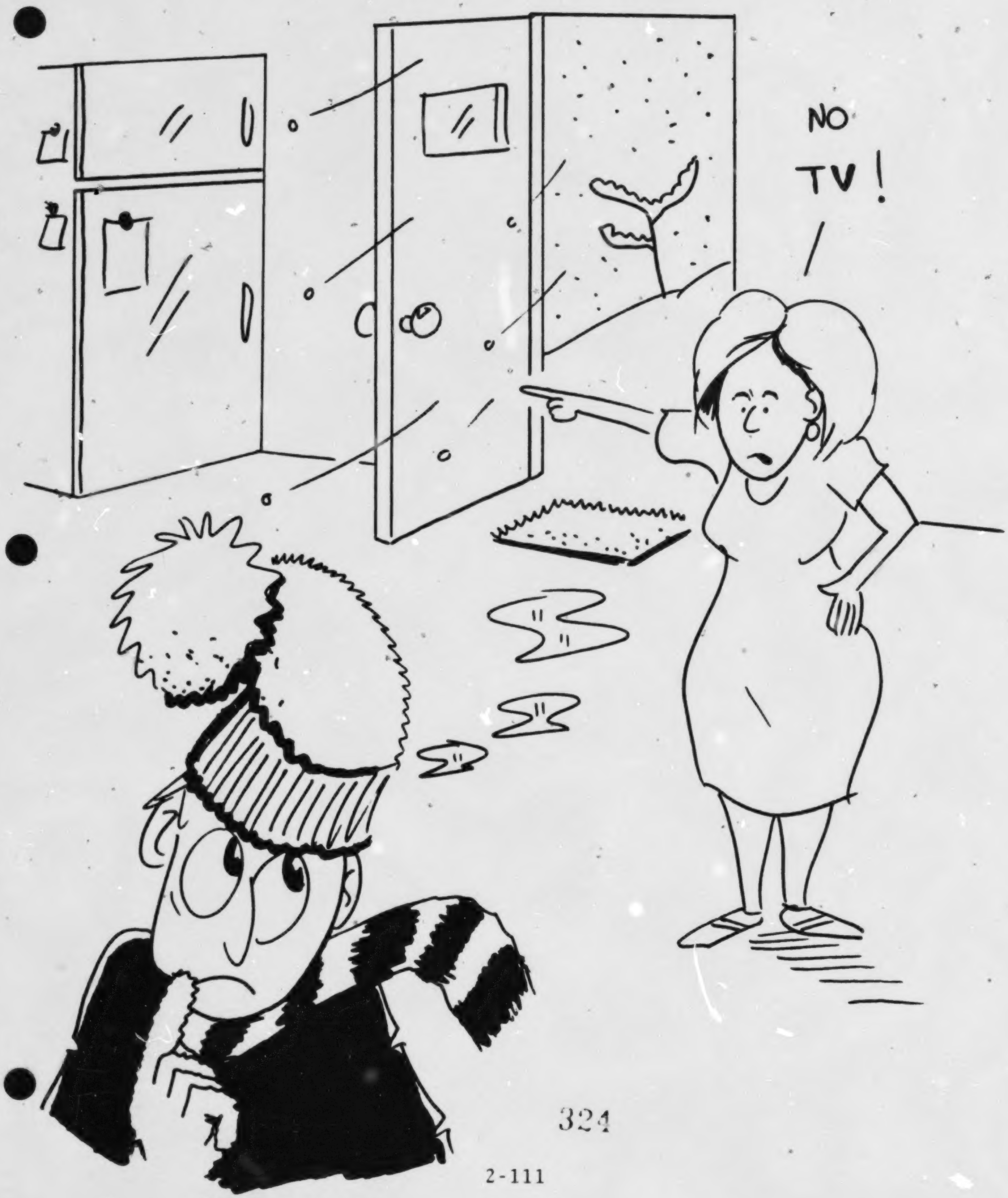
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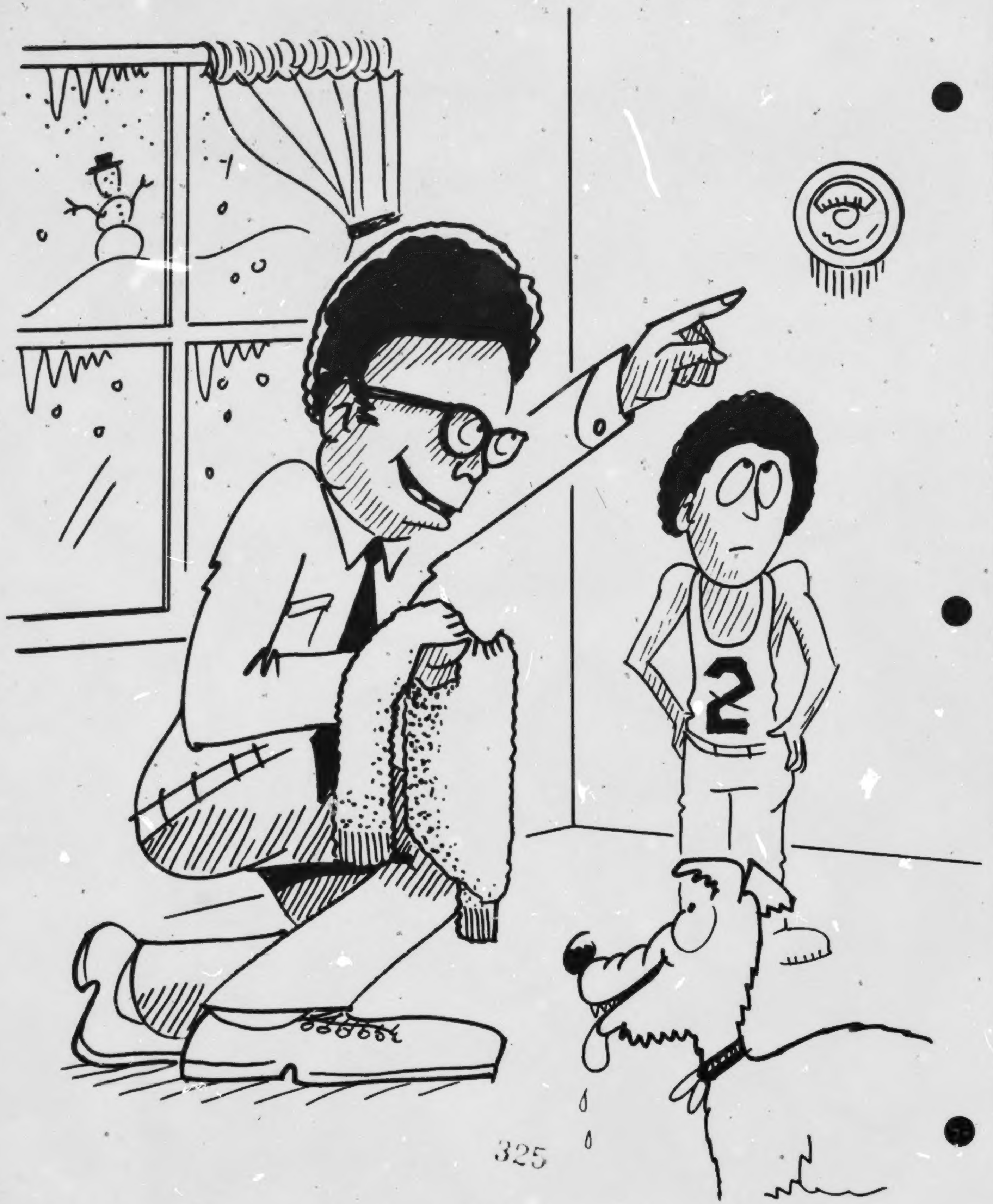
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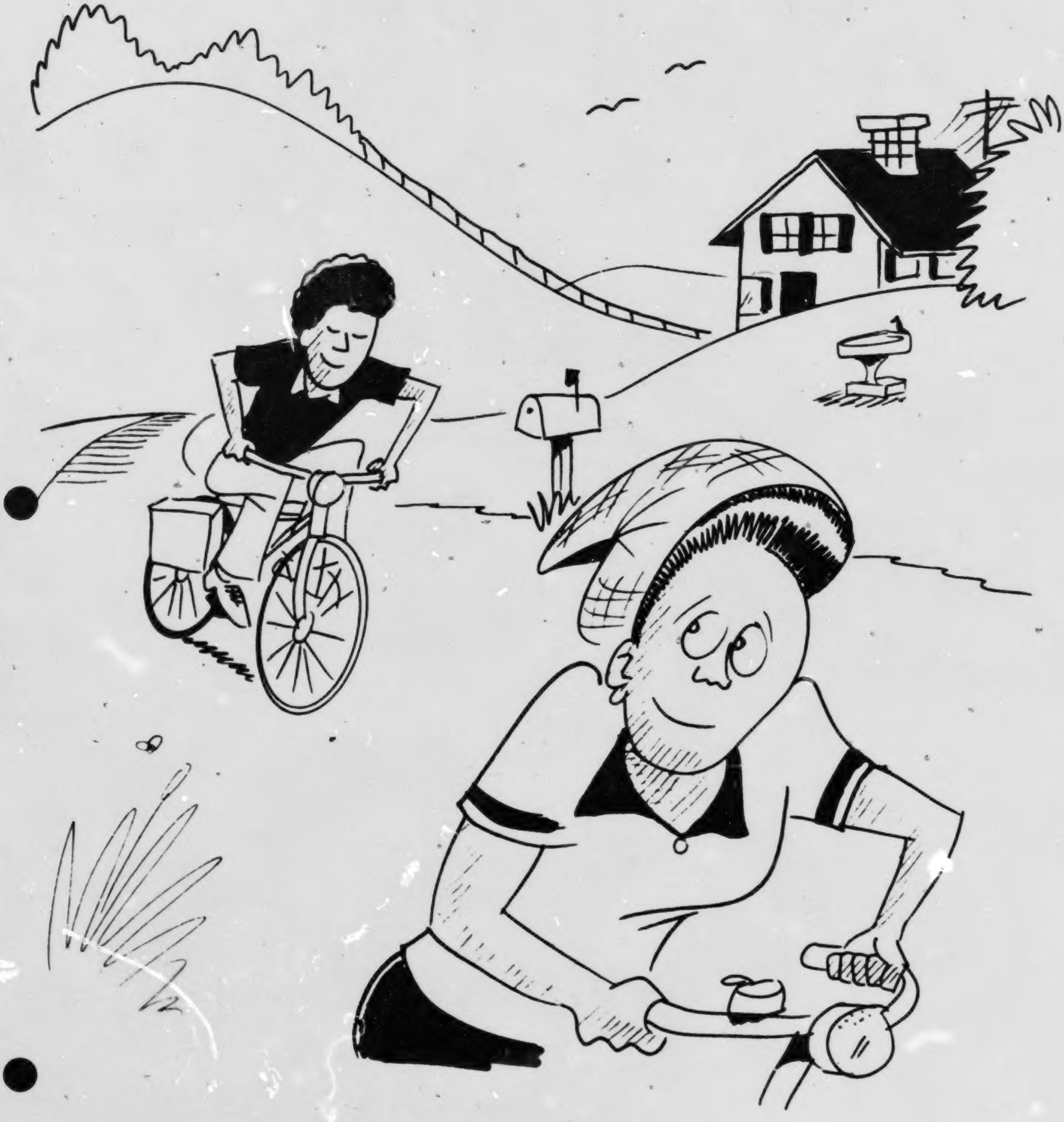

LESSON 3-3: GROUPS' ENERGY HABITS

Rationale

Students will learn about how groups can make an impact upon the energy problem. They will study a case of how a community called Staples learned to save energy and they will pick out the groups that were involved and what impact they had. They will also identify some groups in their community who use energy.

Objectives

1. Students will become aware of groups that practice energy-consumer habits. Teachers can assess the attainment of this activity through students' responses to Activity B in this lesson.
2. Students will learn how they can act to change energy habits in groups. Teachers can assess the attainment of this activity through students' responses to Activity H in this lesson or through Assessment Activity One.

Main Activity

A. Ask the students to read, or read to them, the case on energy conservation in Staples. Talk with the students about how this is a case of one community and an effort of many groups not just individuals, to save energy. Guide a discussion about the Staples case using the following questions:

   1. How many people save energy in Staples? (e.g. all the students in the school, the superintendent, churches and homes in the community)
   2. What groups were involved in saving energy? (e.g. the school, the churches, private homes)
   3. What impact did energy conservation have on the community? (everyone thought that it was a better place to live).

B. There are a great many groups in any community that contribute to energy conservation or waste. Have the students list the groups that they know of in their community that are attempting to save energy and how they are trying to save it. Review with students the different kinds of governmental, business, community service, and other groups that they have learned in Unit I. Put this list on the board or on a large sheet of paper so that students can refer to it later.

C. Have students talk to someone who comes to class who knows about energy conservation measures carried out by groups in the community. Have this person talk about how different groups in the community are helping the community as a whole to save energy. Students should realize that there are a great many groups in their own community that are contributing to energy conservation.

D. Talk with students about the groups that they have listed in terms of how they save energy. Add groups to their list depending upon what the person who has come into class has said. Have them talk about energy wasters or energy conservers in their community and what impact they might make on the community as a whole. Students should be able to see that these groups can have quite a bit of impact, usually more impact than individuals can have alone.

E. Have students collect newspaper or magazine articles about groups that save energy in their community. They should have a picture or a story about each group that they have included on their large list. Talk with students about how each of these groups attempts to save energy and what kinds of things are being done in their community.

F. When students have talked about the kinds of energy conservation actions that are being taken in their community, have them think about how groups in their community could develop better energy habits and how families, schools, businesses, and other organizations could use less energy than they are using now. The students suggest that people in schools or in industry could turn out more lights. Have them discuss their list of groups and things they could do and agree on the ten most important good energy habits that groups in their community could have.

G. Now help the students to make a list of bad energy habits. Have them consider what they think would be the most wasteful things that groups could do in their community. This could include picnics that families or groups or families have where they throw away trash, or the use of lights in school, or the use of heat and lights by businesses. Have students compare their list of good and bad uses of energy groups. Introduce them to ways that they can try to change energy habits of groups from bad to good habits. There are three ways:

1. They can talk to leaders of a group. They can try to convince the group leaders that they should use wise energy habits.

2. They can talk to the whole group by giving a convincing speech or attending a group meeting.

3. They can talk to someone who is a member of a group and get that person to speak up and advocate energy conservation

Students should see just the highlights of how there are three ways that bad energy habits could be changed to good habits. You might use one of the bad habits on their list and demonstrate how, through these three ways, it could be changed to a good habit.

H. Now discuss the pictures that are enclosed with this lesson and/or the cases that are enclosed. Pick out different ways that people are using important techniques to change bad energy habits to good energy habits. There are three cases here. The first case illustrates talking to leaders; the second, talking to the whole group; and the third, getting a member to talk to the group. The same is true for the pictures. The first picture illustrates talking to leaders; the second, talking to the whole group; and the third, getting a member to talk to the group. Students should see how three methods can be used through the pictures and the cases and they should be able to identify ways in which they are used in their community.

I. When students have discussed ways in which they can influence groups to conserve energy, have them discuss specific groups that they might actually try to influence in their school or community. Have them think about which of the three strategies they might use in order to influence these groups.

Grade Level Adaptation

K-1: Have someone come into the class who can talk about groups in the community that are conserving energy. Ask students to draw pictures of one energy conservation method that a group is using in their community. Then have them talk about how they might influence a group such as their families or their school class.

4-6: Ask students to do a study of one community group, breaking into five or six groups in a classroom. Have students give reports to the class about how that community group both saves and wastes energy and plans they have for how that group could conserve energy.

Language Arts Adaptation

K-1: Have students use puppets to act out ways in which groups can conserve energy in their community.

2-3: Ask students to act out roles of different people in their community and how they save energy.

4-6: Ask students to do an interview with someone who is in a group in the community which both wastes and conserves energy. Ask them to report on their interview with the class.

Math Adaptation

K-1: Talk with students about how a group with several people can do more than an individual can do alone. Have them work with the concept of more in terms of one person vs. a small or large group of people doing things to conserve energy.

2-3: Ask students to think of the largest group that they can think of in their community and discuss how they might reach the most people by trying to influence the largest group and some other groups.

4-6: Have students choose one energy group in the community. Have students interview one person in that group about the groups use of energy. Ask students to develop numerical figures for their energy waste on which they can practice various math functions by pooling their figures with the class.

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STAPLES SAVES ENERGY

In the town of Staples people are saving energy. The Staples school system is leading the energy conservation program. The whole school is involved. Over 1,724 students are working to make the community more energy conscious. They have held energy fairs and have gone into the community to help different organizations to save energy.

Staples students helped the church in the community to put new insulation in its walls. They measured the energy reduction and found it was very small. As it turned out, the insulation had not been put in correctly. They went to the people who did the work, and the work was re-done. The church saved over 50 percent of its heating bill in the first year.

The school superintendent needed a new car. The students convinced him that he should get a smaller, compact car. The superintendent said that if the students were going to save energy, then he should take a leadership role. He traded in his brand new car for a small compact. The students were pleased.

Students have also gone through the community to convince families and people who build houses to have better home insulation. Over 10 percent of the families in the community have put in new home insulation. Many of the houses that are now being constructed have better insulation as a result of the students' energy activities.

The students at Staples have a right to be proud. They have helped various groups throughout the community to save energy. As a result, Staples is saving energy as a community at a far greater rate than it had before students began their program.

SANDY GOES TO THE STUDENT COUNCIL

Sandy was a fourth grader and a member of her elementary school student council. She had learned about energy conservation in her fourth grade class. She was concerned about the energy problem. She thought that a school-wide effort could be made by the student council in order to conserve basic lighting and heating energy.

Sandy drew up a plan. She thought that the homeroom representatives of the student council could each help to make the students in their class more aware of energy and that they could make plans for closing windows during the winter and turning out unnecessary lights.

She took her plan to the president of the student council. Jean was delighted. She though it would probably be a good idea, and she said that she would introduce it at the next student council meeting. Jean introduced Sandy's plan and then asked Sandy to speak about it. The student council voted unanimously to accept the resolution. They all respected Jean, and knew that if the leaders were in favor of it, then it had a chance to succeed.

As it turned out, the elementary school became a leader in conservation in the community. Not only Sandy's elementary school, but others also saved both electrical and heating energy through the energy conservation efforts.

FREDDY AND HIS FAMILY

Freddy was a third grader at Wimbleton Elementary School. He had learned about energy conservation in his class, and knew that his family wasted energy in many ways. He decided to do something about it.

Freddy's family was a large one. There were six children, three boys and three girls, and their mother and father. In addition, they had several pets. All of the members of the family used the lights and lost heat by opening and closing doors. Therefore, they lost a lot of electrical energy.

Freddy decided that he was going to talk to his family one night at the dinner table. He drew up a plan. He decided that his family could save a great deal on electrical energy. He would propose that people turn out the lights when they leave rooms. For example, some lights in the fixture above the dining room table could be taken out. They really did not need to have that much light when they had dinner. People could also find different ways to get to their sports activities and other social functions besides using the family car.

At dinner the next night, Freddy presented his plan to his family. He spoke convincingly about energy conservation. He talked about the money they would save to do things as a family.

Freddy's brothers and sisters and mother and father were convinced. They decided to try it. The family saved over 25% of their electricity. As a result they could enjoy doing more things together.

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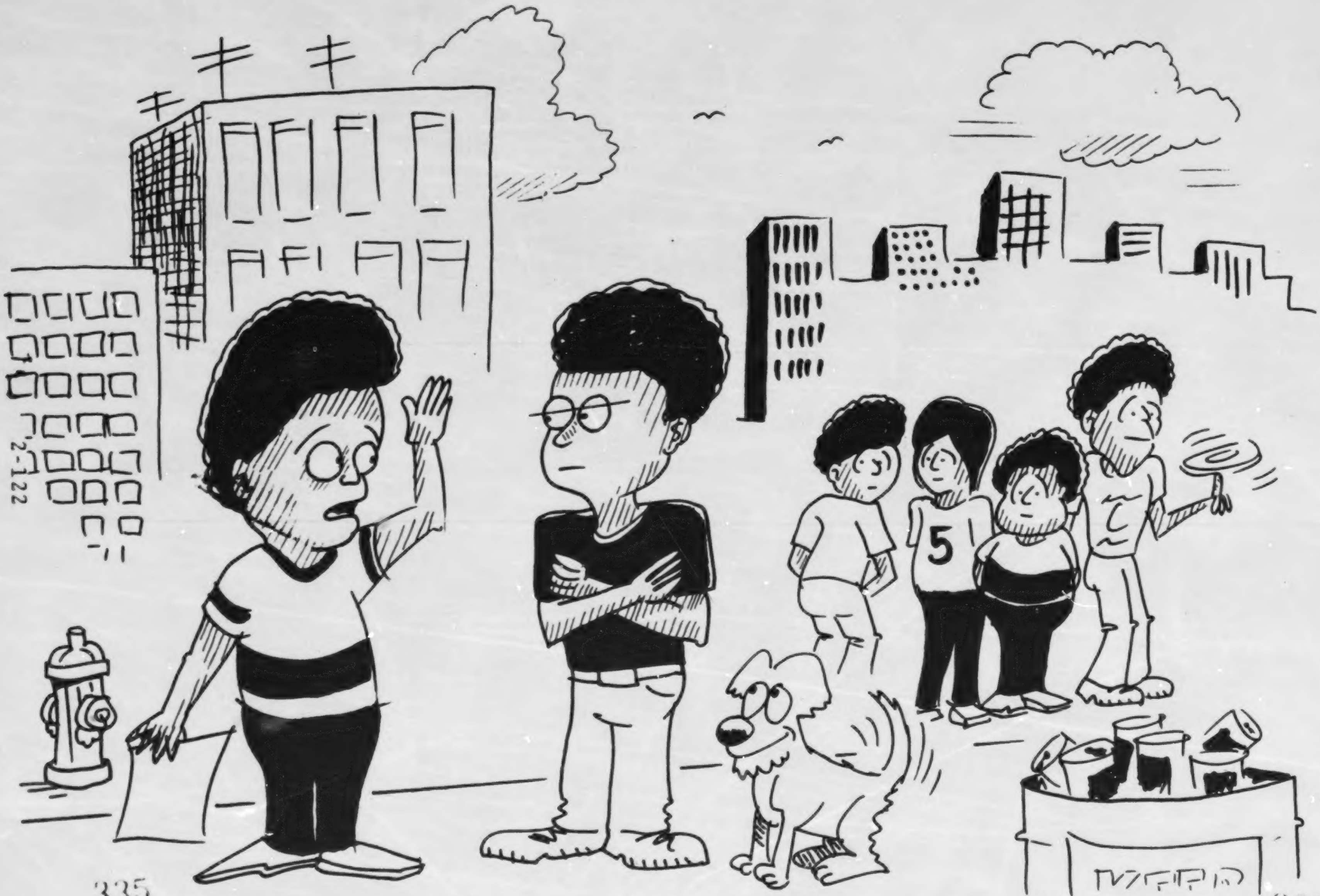
ROBIN AND THE LEAGUE OF WOMEN VOTERS

Robin was in second grade. She really liked her science class where she was studying energy conservation. She learned a lot about ways to conserve energy, and thought that other people should learn about this information. If only they knew about it, then they could probably do something about the energy problem as a community.

Robin's mother was a member of the League of Women Voters. This organization gathers information about a lot of issues and talks to people about them. Robin talked to her mother about the League of Women Voters doing a study of the energy problem in their community and making some recommendations about how people might conserve energy.

Robin's mother agreed to speak at the next League of Women Voters' meeting in order to see whether or not people wanted to study the issue. She spoke convincingly about energy needs in the community. The League agreed to do a study and to inform people in the community about ways they could save energy.

As a result, Robin's community saves much more energy, and people in the community lead better lives.



LESSON 3-3: PICTURE 3-1

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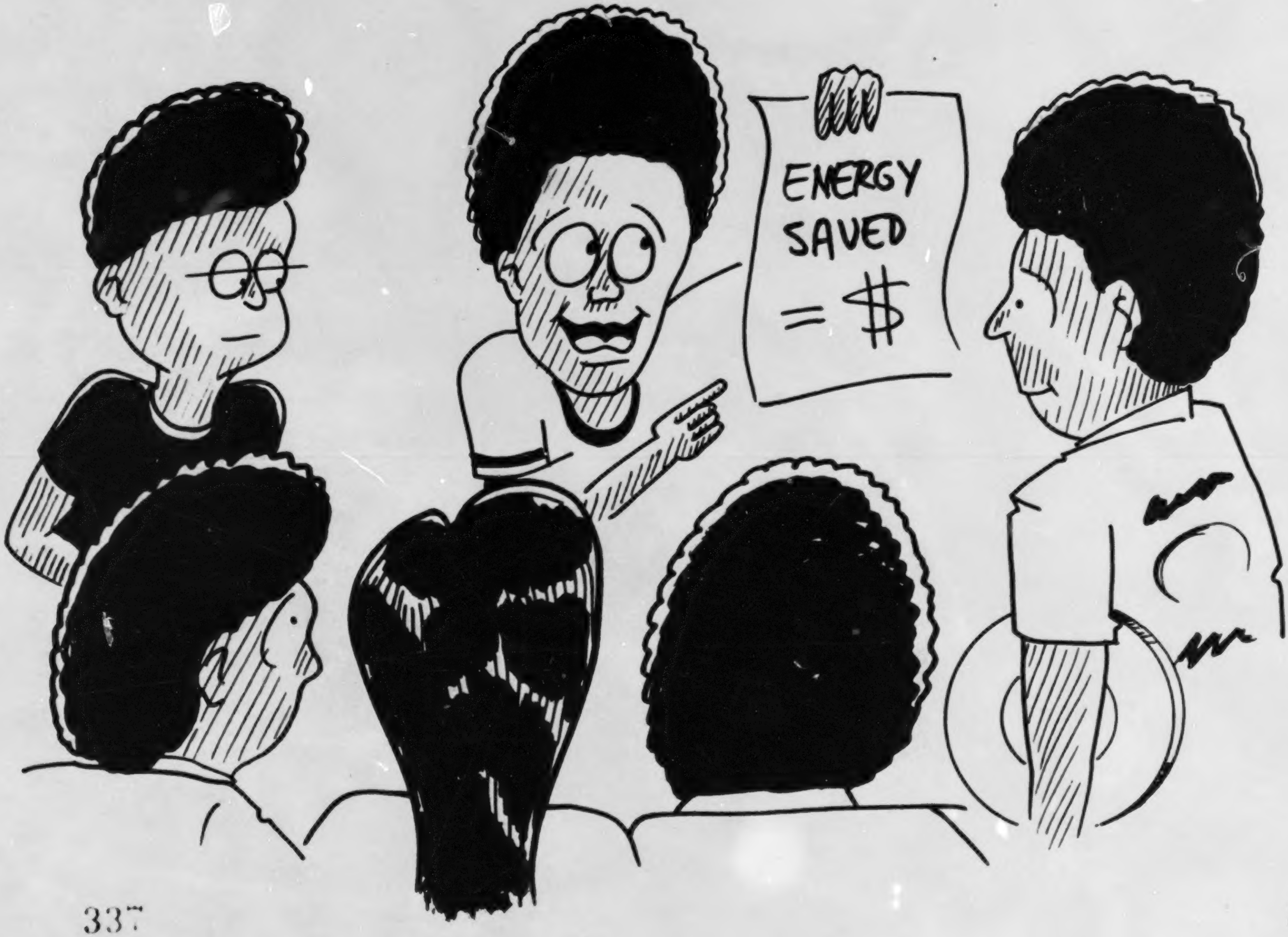
ENERGY
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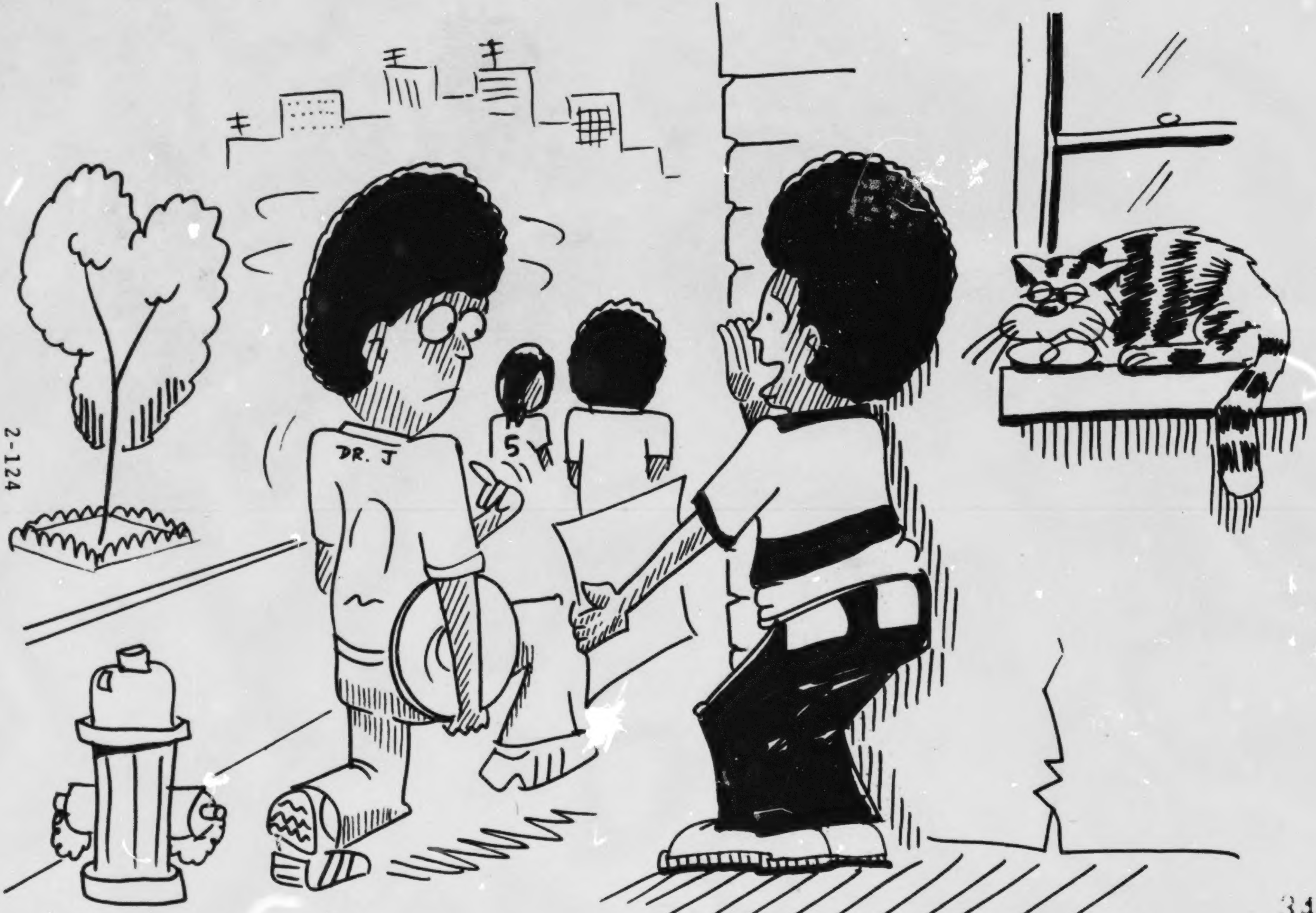
LESSON 3-3: PICTURE 3-2

2-124



LESSON 3-3: PICTURE 3-3

LESSON 3-4: ENERGY HABITS IN YOUR HOME AND SCHOOL

Rationale

The purpose here is for students to apply their knowledge of energy habits and ways that they can change bad habits into good habits. The importance of this lesson is that students will transfer their knowledge of habits into action ideas in their home and school.

Objective

Students will apply their knowledge of energy habits and ways to change them to situations in their home and school. Teachers can assess the achievement of this activity through students' responses to Activity C in this lesson or by using Assessment Activity 2 at the end of this chapter.

Main Activity

A. Review with students the energy products and their uses in their homes and school from Unit One. They should be able to talk about the way various products are used in their home and school and what those products are.

B. Talk with students about how they have energy habits at home and school that are like the ones they have studied in this chapter. Students should be able to form a list of what they think are the best energy habits they have at home and school and what they think are the worst habits. These lists of the the best and worst habits should be posted where everyone can study them.

C. Now have students do an exercise and form a larger list which involves four different columns. They should be able to identify who uses energy products in their homes and school. They might state, for example, that parents, teachers and students use energy products. Secondly, they should indicate one important thing that this person or group uses. They might use lights, or heaters, or dishwashers, or crayons. Thirdly, they will identify what change in habit they think is important for this person or group to have. They might suggest that they should use less lights, or use crayons until they are entirely used up. Finally, they should indicate how they would change the habits of that person or group using the techniques that they have studied in previous lessons in this chapter. A typical list could look as follows:

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	Who	What Use	What Change	How Change
1.	Teachers at home	Lights	Use lights less	Convince
2.	Students	Crayons	Use less crayons	Reward
3.				

Students should be able to fill in their lists with at least five or six groups and what energy products they use, what change they think is needed, and how they think the change should be made. Through this activity they should become aware of the habits that exist in their homes and their school and what they can do about them.

D. Have students draw pictures of various ways that the people and groups involved in their lists can make changes in their energy habits. Talk with students about their pictures and what kinds of changes are illustrated by them.

E. Now help students to role-play one of the people or groups and the person who wants to change their behavior. Have them try to act out how they would change that person or group's behavior by working with the other students.

F. Now summarize the activity in this lesson by talking about one or two changes on the students' lists and holding a class discussion about how they would change this person's behavior and the importance of changing bad energy habits to good energy habits.

Grade Level Adaptation

K-1: Have people come in from various groups that the students name in their homes and school that use energy. Have the students talk to those people about how they use energy and what might be effective ways to change their behavior. Talk with students about ways that they might help to change people's habits or behavior.

4-6: Ask students to write a story about each row of the table that they have constructed. Have them talk about a particular person or group, what energy they use, how they use it, and what changes can be made.

Language Arts Adaptation

K-1: Ask students to make a tape recording of their description of a person or a group, their energy habits, and how they might change their energy habits.

2-3: Ask students to act out different ways they might try to help someone to change their energy habits.

4-6: Ask students to create a dialogue showing what person or group uses energy, how they use it, and how changes in their energy habits can be made.

Math Adaptation

K-1: Help students to look at their list of how they might change people's energy habits. Ask them to talk about where the same tactics can be used with different individuals or groups and where different tactics are needed. Teach students the concepts of similarity and difference using these ideas.

2-3: Have students count the number of items in each of the columns. Which are the same and which are different? You might want them to subtract the difference between those items which are the same, such as the energy products, and those that are different.

4-6: Have students calculate how much change is involved in their strategies for change by using math functions to determine, for example, how much electricity will be saved by turning down the thermostat.

LESSON 3-5: ENERGY HABITS IN YOUR COMMUNITY

Rationale

In this lesson students will apply their knowledge of energy habits in their community and see ways that they can change bad energy habits to good habits. This lesson will promote an important transfer of knowledge into the everyday lives of students.

Objective

Students will apply their knowledge of energy habits in their community and will learn how to apply them to actual groups and settings. Teachers can assess the achievement of this objective through students' responses to Activity B of this lesson and through the use of Assessment Activity 2 at the end of this chapter.

Main Activity

A. Have students review the community groups that they know and have them talk about the ways these groups save and waste energy. Have them make a list of the good and bad habits in their community, or use previous lists that you have made in this unit. Students should come away from this initial activity with a review of their knowledge of groups in their community and of energy habits.

B. Have students develop a chart (like the one they made in the previous lesson for home and school) about individuals and groups in their community and ways they use energy, what changes they can make, and how they can make changes. They should use the knowledge that they have of ways of changing individual and group habits and apply it to community groups that they know. A typical chart could look as follows:

	Who	What Use	What Change	How Change
1.	Grocery store	Lights	Use less lights	Talk to the manager of the store
2.	Neighbors	Heating	Use less heating	Talk with parents and convince them to talk with neighbors
3.				

Students should fill in this chart with the major people, uses, changes, and ways of changing energy habits. They should become aware of groups in their community and how they might act to change energy habits which would be beneficial for everyone.

C. Have one or more community members from the groups which students have identified come into the classroom to talk with students about what energy they use, what changes are needed, and how students might help them to change. Have students talk about the plans that they have thought of and have community members react to those plans.

D. Work with students in conducting a role-play that involves them taking the roles of community members. Have other students play the roles of students trying to convince community members to change their energy habits. Have students talk about the problems and the opportunities they see for making changes in their community.

E. Summarize this activity by looking at the students' charts again and talking about their plans for change. Students should be asked why they think these plans are important and what problems they think they will have in implementing them.

Grade Level Adaptation

K-1: Have one parent come to class and talk with students about each of the items in the four columns. Have students talk with the parent about how they might best try to change energy habits in their community.
4-6: Have students talk with members of one or more community groups about alternative strategies for changing energy habits. Have the students report on what feasible plans for change they see as the result of their conversations.

Language Arts Adaptation

K-1: Ask students to do a pantomime of various community members and how their energy habits can be changed.
2-3: Students may write out sentences that demonstrate the steps they would take in changing habits in a particular community group or with an individual.
4-6: Students can construct a play which is aimed at community energy conservation and which represents the groups that would be involved and the strategies for change.

Math Adaptation

K-1: You can continue to teach students the concepts of same and different by using the material from the columns in your chart.

2-3: Students can learn about same and different and make mathemathical calculations of the number of items which are the same and different in each of their lists in their chart.

4-6: Again talk with students about how change could be measured in terms of what they want to do about community energy and have them make calculations about energy change, depending upon what specific strategies they have planned to use.

LESSON 3-6: CHANGING ENERGY HABITS

Rationale

The purpose of this activity is for students to actively engage in changing energy habits in a selected setting in their home and school or community. They will practice the skills they have learned in changing energy habits and will carry out their own activity. The carrying out of this activity is fundamental for students to become effective energy actors. They need to be able to practice skills and make them an integral part of their everyday lives.

Objectives

1. Students will show concern for changing energy habits. Teachers can assess the attainment of this objective through students' responses in Activity E of this lesson.
2. Students will practice evidence-gathering and decision-making skills in changing energy habits. Teachers can assess the achievement of this objective through the reports that students give of their activities in Part E of this activity.

Main Activity

A. Talk with students about how they might undertake a class project. This class project can be done in small groups or with the class as a whole. The purpose here is for students to try to change the energy habits of one individual or group in their community. This person or group can be in their family, in their school, or in their community environment. Discuss with students what the major target or targets will be for their activity. Who is involved? What individual or group's habits do they think they want to change? They might want to change the energy perceptions of their families or do a school project, or they may want to work with a particular group in their community. Divide students into groups that have similar interests in changing particular habits of a particular individual or group.

B. Now help the students to do a study of the individuals or groups that they have chosen to change. They should be able to identify who the persons or groups are and what ways they use energy, what energy they use, and what they want to change about the energy habits of the person or group. Give students some time to gather evidence about their target group and to practice their evidence-gathering skills.

C. Then ask students to meet as individuals or groups, or with the entire class to design plans for changing the energy habits of a particular individual or group they have chosen. They will have gathered information which will be relevant to their decisions. They should then generate alternatives within their plans of ways they want to try to change energy habits. They should make a choice about which way they prefer to make the change. They should also consider the outcomes of their choice. These plans should be shared with other students or with you in order to check their feasibility and potential for success. Hopefully students will design straightforward, feasible plans which can be implemented in a short period of time and which have a relatively good chance of being successful.

D. Now help students to carry out their plans. Be sure that they keep a log in some form regarding their activities. You might want them to report back to the class orally or in written form on a daily or weekly basis.

E. Have students present to the class the results of their activities. You may want to use the following questions to guide classroom discussion:

1. What people or groups did you choose to work with in changing energy habits? (e.g., my brother, the other third grade class, the Chamber of Commerce)

2. What was your plan for changing energy habits? (e.g. any of the tactics that students have learned for changing the habits of individuals or groups)

3. What do you think were your successes in trying to change energy habits? (e.g. People did change, people changed a little.)

4. Why do you think it is important to change energy habits? (e.g., People will save more energy, there will be more energy for all of us.)

Grade Level Adaptation

K-1: Have students concentrate on one person or group and one energy product in trying to change energy habits. Have the person or a representative from the group talk with the class about the feasibility of their plans for change and work with them in trying to make their plans successful.

4-6: Have students divide into groups to carry out their plans. You may want them to present formal written plans and evaluations of their activities in carrying out their plans.

Language Arts Adaptation

K-1: Help students to act out how they might carry out their plans to change energy habits.
2-3: Have students keep logs in terms of words and sentences on their activities in changing energy habits. In this way they can practice whatever language arts skills you are currently teaching.
4-6: Ask students to keep logs describing daily activities. Be sure that the logs include why what they are doing is important and any language arts skills that you are currently teaching.

Math Adaptation

K-1: Talk with students about the importance of changing energy habits, and use a thermometer to have them gauge how important their activities are. They should be able to see that low numbers on the thermometer reflect lesser importance and higher numbers reflect more importance. You can use this to teach students about the thermometer and numbering, as well as about the importance of saving energy.
2-3: Have students count the hours or days they spend in trying to change energy habits.
4-6: Ask students to write up the results of their attempt to change energy habits and give some numerical form for the impact they think changing energy habits will have.

ASSESSMENT ACTIVITIES FOR CHAPTER 3

The following assessment activities are designed to evaluate students' knowledge of different ways that individuals and groups can be affected in terms of their energy habits and how students might actually work on changing those habits. These skills are essential for the development of effective energy actors. Assessment Activity 1 can be used at the end of the chapter or in conjunction with Lessons 3 or 4 or at the end of the chapter as a Summary Activity.

Assessment Activity 1. Assessment Activity 1 illustrates how students can affect individuals and groups. They have a list of activities that involve reward and punishment. They have learned how to convince and lead individuals, how to talk with leaders of a group, or the group itself, and how to get a member of a group to talk with that group. They should be able to sort activities into those that are appropriate for individuals, those that are appropriate for groups, and those that are appropriate for both. A key is included on the second sheet of this assessment.

Assessment Activity 2. This assessment activity involves students' changing energy habits. The picture gives students a situation. They should determine who is involved in the picture, what energy they are using, what changes need to be made, and how these changes might be made. They should write their responses to this question in the space underneath the picture. The answers are given in the key on the second page of the assessment.

TALK TO A MEMBER

LEAD

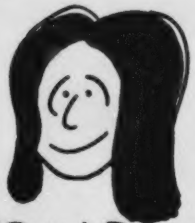
REWARD

TALK WITH LEADERS

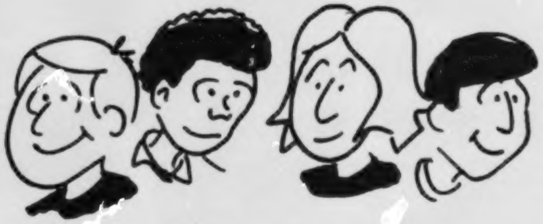
PUNISH

CONVINCE

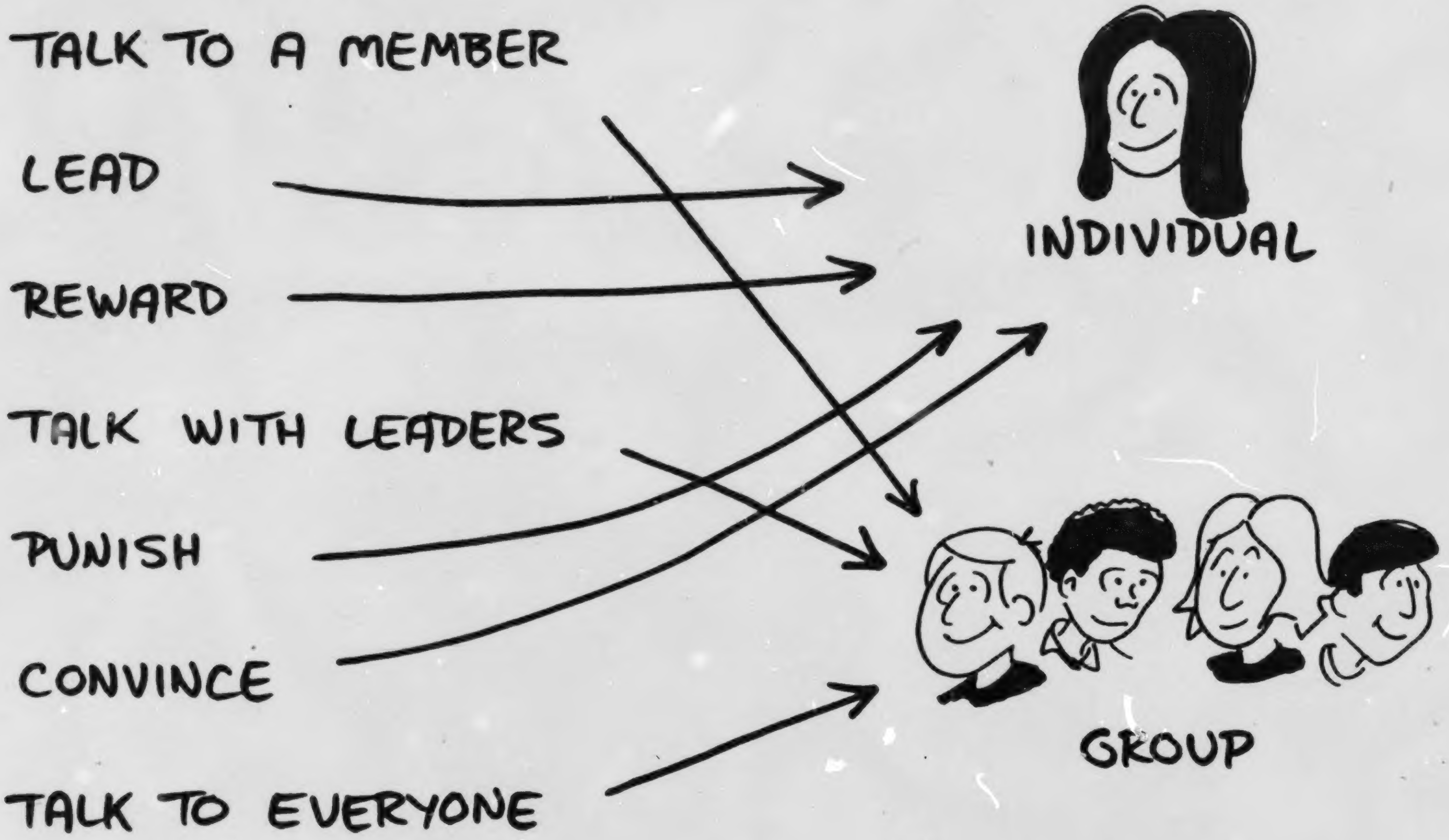
TALK TO EVERYONE



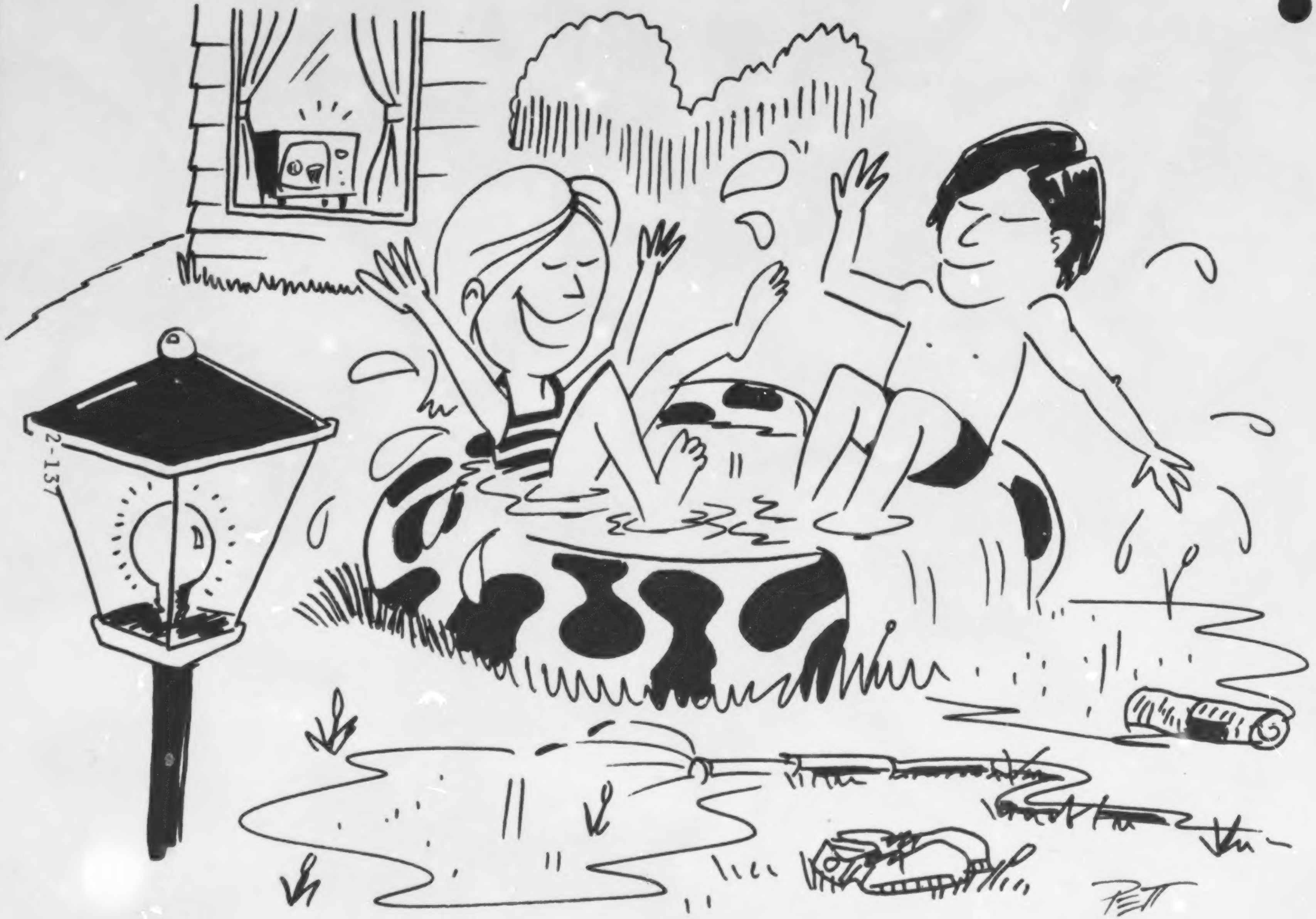
INDIVIDUAL



GROUP

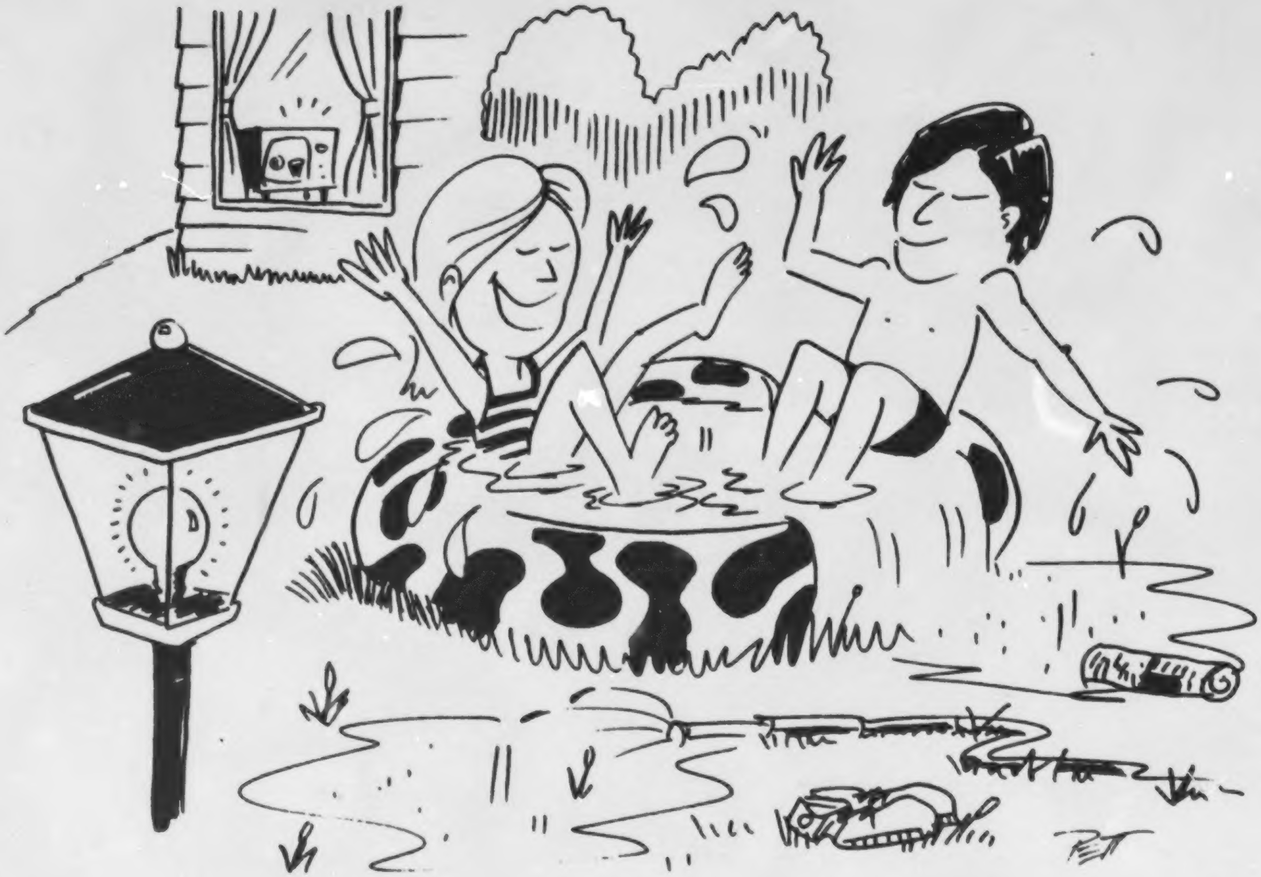

TALK TO A MEMBER
LEAD
REWARD
TALK WITH LEADERS
PUNISH
CONVINCE
TALK TO EVERYONE
INDIVIDUAL
GROUP

KEY



CHAPTER THREE: ASSESSMENT ACTIVITY 1-2

CHAPTER THREE: ASSESSMENT ACTIVITY 1-2



WHAT'S BEING WASTED?	WHAT SHOULD BE DONE?
• WATER — THE HOSE IS RUNNING	• TURN IT OFF
• ELECTRICITY — THE OUTSIDE LIGHT IS ON AND IT'S DAYLIGHT	• TURN THEM OFF BEFORE PLAYING IN THE WATER
— THE TELEVISION IS ON	• IF NOBODY'S WATCHING IT, TURN THE SET OFF

STUDENT ENERGY SURVEY

UNIT II

This assessment of knowledge, skills, attitudes, and participation habits can be used as a pretest, a posttest, or both. A copy of the survey is enclosed. This survey is designed to measure student growth and includes the main ideas from the entire unit.

There are three parts to this survey. The first part assesses knowledge and skills, and the second part assesses attitudes about energy conservation. The third section focuses on habits of participation regarding energy conservation.

Teacher Directions:

Section I

1. Read the directions for the first section of the test aloud to the class.

2. Demonstrate on the board how students should mark their answers.

3. Go over the example to make sure students understand that they should circle the correct answer.

4. You may want to read each question as the student does. Continue until all fifteen items are completed.

5. Here is the key for correct answers:

    1. B
    2. B
    3. A
    4. C
    5. B
    6. B
    7. A
    8. B
    9. B
    10. A
    11. A
    12. A
    13. C
    14. C
    15. A

Section II and Section III

Repeat the above procedure for Section II, then Section III. Make sure the students understand these directions as they are different from those for the first section. They should put an X on the face that is true about them in these two sections.

Energy - Unit II Name________________________________

Section I: Knowledge & Skills

DIRECTIONS:

1. You will be answering some questions to see how much you know about energy.
2. Read these directions silently while your teacher reads them aloud.
3. After each statement, circle the letter of the BEST answer.
4. Here is a practice item. Circle the letter of the BEST answer.

   People get energy from

   A. food.
   B. books.
   C. toys.

   Food is the BEST answer, so circle A.

5. Ask your teacher if you need help.

---

1. The best way to find out how much electricity is used in your home is to

   A. count the light bulbs.
   B. read the electric meter.
   C. read the thermostat.

2. Habits are a routine because they are done

   A. monthly.
   B. daily.
   C. yearly.

3. Which of these activities does NOT show energy conservation?

   A. I don't like this game anymore. I'll throw it away.
   B. Let's save our paper bags. They can be used again.
   C. Let's buy pop in glass bottles. They can be recycled.

4. Which of these is an example of a community service organization?

   A. factory
   B. airline
   C. fire department

5. A kilowatt-hour is a unit of

   A. time.
   B. energy.
   C. distance.

6. An example of a good energy habit is

   A. leaving the TV on when I leave the room.
   B. turning lights off when leaving the room.
   C. asking my parents to drive me to school.

7. Driving more miles uses

   A. more energy.
   B. less energy.
   C. the same amount of energy.

8. If everyone changed a bad habit to a good habit, what would happen?

   A. There would be more conflict about energy.
   B. Less energy would be used.
   C. People would spend more money on energy.

9. Energy can be saved by

   A. driving faster.
   B. turning lights off.
   C. using more paper.

10. Which of these is often recycled?

   A. cans
   B. candy wrappers
   C. pens

11. A place where people live and act together in doing things is a

   A. community.
   B. church.
   C. street.

12. One way of gathering information about a service organization is to

   A. talk to a member.
   B. think about it.
   C. write it down.

13. A major way of using energy in homes is

   A. driving cars.
   B. street lights
   C. heating.

14. An example of a good "Energy Waster Question" would be

A. Can I afford this product?
B. Is this color my favorite?
C. Do I really need this product?

15. Fossil fuels are important energy

A. sources.
B. savers.
C. users.

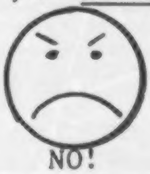
STOP UNTIL YOUR TEACHER TELLS YOU TO GO ON.

Section II & Section III: Attitudes & Participation

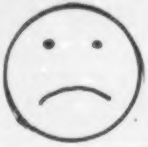
DIRECTIONS:

1. You will be reading some statements to see how you feel about energy.
2. Read these directions silently while your teachers reads them aloud
3. After each statement, put an X on the face that is true about you. There are five answers to choose from.

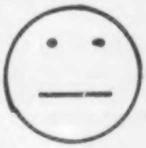
If you strongly disagree, put an X on the face that looks like this.



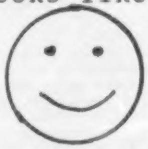
If you disagree, put an X on the face that looks like this.



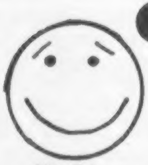
If you partly agree or are not sure, put an X on the face that looks like this.



If you agree, put an X on the face that looks like this.

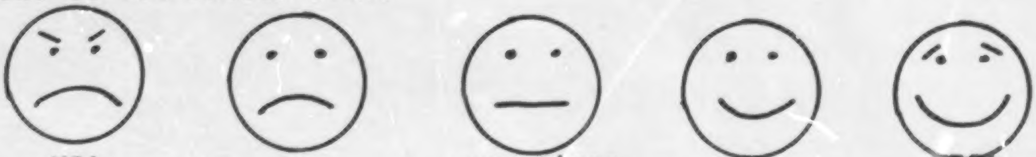


If you strongly agree, put an X on the face that looks like this.



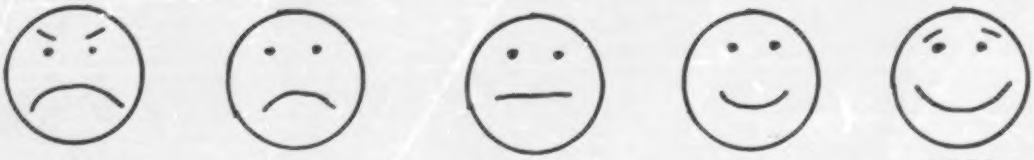
EXAMPLES:

I want to eat better food.



NO! no sometimes yes YES!

I like to ride in a car.

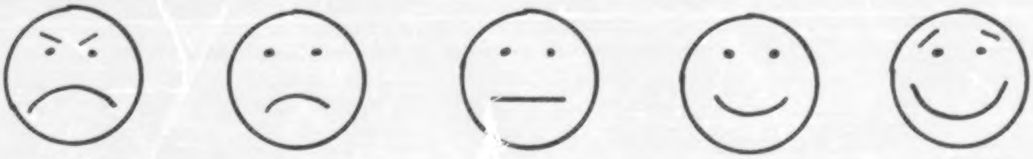


NO! no sometimes yes YES!

If you have questions, ask your teacher.

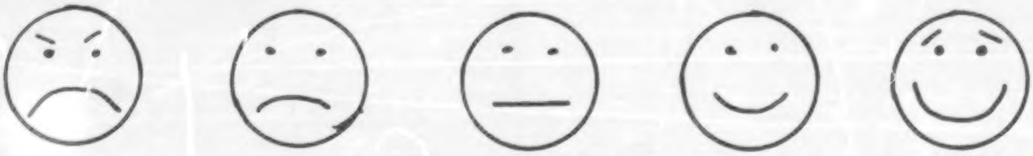
Section II: Attitudes

1. I want to change my habits to save energy.



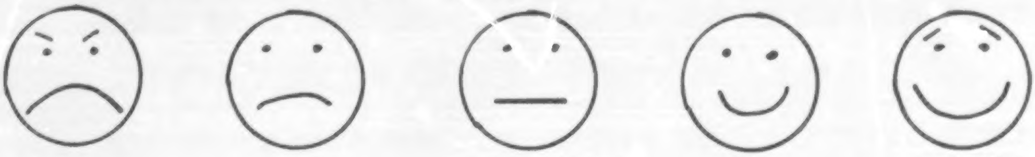
NO! no sometimes yes YES!

2. Energy habits are important to me.



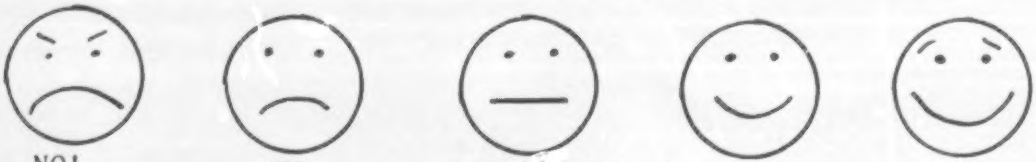
NO! no sometimes yes YES!

3. It is OK to use lots of energy.



NO! no sometimes yes YES!

4. I would rather travel by car than walk a short distance.



NO! no sometimes yes YES!

4. I have asked someone to turn down the heat to save energy.

NO!

no

sometimes

yes

YES!

5. I recycle bottles and cans.

NO!

no

sometimes

yes

YES!

6. I leave lights on in my home when I do not need them.

NO!

no

sometimes

yes

YES!

7. I waste energy in my home.

NO!

no

sometimes

yes

YES!

ADDITIONAL INSTRUCTIONAL MATERIALS

GRADES 2-3

This is an annotated selection of energy education materials appropriate for the indicated grade level. To aid the teacher in making an astute selection the following criteria have been used: 1) usability in an instructional setting, 2) compatibility with Indiana's energy curriculum project, 3) emphasis on active student participation, 4) emphasis on the development of an energy conservation ethic, 5) relevance to the students' lives, and 6) accuracy and up-to-dateness of energy facts and trends.

The Best Present of All. Houck, Oliver A. Reprint from Ranger Rick Nature Magazine, April 1974. National Wildlife Federation, 1412 Sixteenth Street NW, Washington, D.C. 20036. No charge for single copy, additional copies $.30 each.

> Illustrated story (in fantasy form) about forms of energy. Could easily be converted into a play.

Community Workers and the Energy They Use. (Grade 2) Interdisciplinary Student/Teacher Materials on Energy, the Environment, and the Economy. National Science Teachers Association. Available from U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, Tennessee 37830. 1976. 61 pp. No charge.

> Twelve lessons, ten of which deal with various community workers who work directly with energy or who make decisions about energy such as the farmer, grocer, meter reader, truck driver, and local government official. Complementary to Indiana energy materials, especially Unit II.

Electricity and How It Is Made. Encyclopedia Britannica Education Corporation, 425 North Michigan Avenue, Chicago, Illinois 60611. $14.00/rental.

> This film illustrates how electricity is produced, what it does, and how it is used. Uses simple demonstrations.

Energy. Gateway Products, Inc., University of Arizona, Bureau of Audio-Visual, Tucson, Arizona 85721. $60.00/purchase.

> This film shows how different forms of energy make things move. Illustrations include muscles, springs, gasoline, steam, air, and water.

Energy and Matter. Instructor Curriculum Materials, Danville, New York 14437. $4.95 pre-paid.

> Six poster sets that feature experiences and observations. The back of each poster has activity suggestions.

364

Energy and You. Topeka Outdoor Environmental Education Center, 1601 Van Buren, Topeka, Kansas 66612. $2.50.

This is a simple introduction to the interaction of humans and their energy needs. It can be used as a supplement to any basic skill materials with pre- and post-test included.

Energy and Transportation. (Grade 3). Interdisciplinary Student/Teacher Materials on Energy, the Environment, and the Economy. National Science Teachers Association. Available from U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, Tennessee 37830. 1976. 61 pp. No charge.

Seven lessons integrating knowledge, skills and values about transportation systems and energy use. Student materials include pictures, checklists and stories.

Environmental Education, Energy-Transportation. (Grades K-8). The New Jersey State Council for Environmental Education, Montclair State College, Montclair, New Jersey 07042.

Student activities combining social studies, math, science, English and language arts concepts in the study of energy as applied to transportation systems.

Everyday Conservation: Energy and Resources. Instructor. Available from Social Studies School Service, 10,000 Culver Blvd., P.O. Box 802, Department E, Culver City, California 90230. Order #INS 762. $5.95 plus postage.

Eight 15 1/2" X 23" color posters and 16 task cards bound in protective covers. Topics include taking care of personal belongings, not wasting food, conserving water and electricity, recycling, and oil conservation. Very complementary to Indiana's materials.

Instructor. "The Energy Book." October, 1978. pp. 57-65.

Practical article featuring "Ernie the Energy Bug" and ideas for an awareness campaign, conservation activities, and an energy fair. Background materials on fossil fuels and alternative sources are also included.

Iowa Energy Conservation Packet. (Grade 3). Iowa Energy Policy Council, 215 E. 7th Street, Des Moines, Iowa 50309. 1977. 53 pp. $2.00.

Many activities attractively illustrated in a looseleaf binder. The focus is primarily on energy and energy awareness. Materials provide for a great deal of student involvement.

NRG. Public Relations Department. Educational programs and services American Petroleum Institute, 2101 "L" Street, N.W., Washington, D.C. 20037. 16 pp. No charge for single copy.

Illustrated storybook about energy.

Unit III: Energy in Action

An Energy Curriculum for the Elementary Grades

eecp
energy
education
curriculum
project

Lt. Gov. Robert D. Orr, Director
Indiana Department of Commerce

Harold H. Negley, Superintendent
Indiana Department of Public Instruction

UNIT III: ENERGY IN ACTION

Rationale

In Unit III, students study two different ways that energy actions are taken. First of all, they study how energy sources are transformed into energy and energy products. They study the transformation process in order to understand how the sources, the transformation process itself, and the product are all involved in energy use. Secondly, they study what actions people can and do take in order to improve the process of transformation of energy and the use of energy products.

Chapter One focuses on the transformation process itself. Students see how energy sources are transformed. They also study new energy sources and how they are being planned and used across the country.

Chapter Two focuses on how people are solving energy problems. Students study a wide range of energy problems and the actors and issues that are involved. They also study what individuals and groups can do in helping to solve the energy problem. This chapter concludes with a class project which will help them plan throughout the entire unit so that the class can undertake a major energy conservation effort, based on their analysis of the problems and needs in their homes, schools, or communities.

Chapter Three focuses on energy outcomes for people and for the planet. As energy is used it has an effect on both our own everyday lives and on the planet which we inhabit. Here, we will consider the global implications of energy use. Students will also take a look at the possibilities of energy use in the future and plan for their own energy conservation activities.

One central feature of this unit is that a class project will be built throughout its chapters. Hopefully the class as a whole will be able to share information and do something significant as a result of their knowledge and skills in problem-solving in the energy area.

Objectives

Chapter One

1. Students will be aware of the many ways that energy comes to us and how it is used (Lesson One).

2. Students will know the concept of energy transformation (Lesson One).

3. Students will know how food produces human energy and how the use of food as an energy source affects their use of human energy (Lesson Two).

4. Students will know the processes of transforming non-human energy sources into energy and energy products (Lesson Three and Four).

5. Students will know how solar and nuclear energy can be used as alternative energy sources (Lesson Five).

6. Students will rate energy conservation as a high priority in their everyday lives (Lesson Six).

7. Students will develop habits of energy conservation based on their knowledge of energy sources (Lesson Six).

Chapter Two

1. Students should recognize the dimensions of the energy problem as it applies to their everyday lives (Lesson One).

2. Students will become aware of themselves as important energy actors, and of a wide range of people who are involved in energy issues (Lesson Two).

3. Students will know the major energy actors involved in energy issues, and apply their knowledge to their own study of energy issues (Lesson Two).

4. Students will know basic energy issues and apply them to their own energy problems in their local community (Lesson Three).

5. Students will learn important skills in carrying out activities as individuals in solving their own energy problem (Lesson Four).

6. Students will recognize how groups can function to help solve energy problems (Lesson Five).

7. Students will develop skills in group decision-making, applying them to their local energy situation (Lesson Five).

8. Students will acquire basic valuing skills in making energy decisions (Lesson Six).

Chapter Three

1. Students will apply their knowledge of energy and problem-solving to a situation that is important to them (Lesson One).

2. Students will know a variety of outcomes of the energy situation for people (Lesson Two).

3. Students will be able to define and give examples of global energy interdependence (Lesson Three).

4. Students will know the basic steps involved in forecasting energy alternatives (Lesson Four).

5. Students will apply their knowledge of forecasting to their own everyday lives, now and in the future (Lesson Five).

6. Students will apply their knowledge and skills to developing their own plan for energy conservation (Lesson Six).

CHAPTER ONE: ENERGY COMING AND GOING

Rationale

This chapter focuses on how energy sources are transformed into energy and energy products. It also shows ways in which people use the energy and energy products that are produced. The first lesson in this chapter is key. It focuses on the idea of "transformation." It shows students a variety of ways in which energy sources are transformed into energy and energy products and how energy is used in the actual transformation process. As a result of this lesson, students should have a good idea of how the energy problem is one not only of sources, but of how we process that energy, and eventually, how we use it.

The middle lessons of this chapter focus on human and non-human energy sources and how they are transformed into energy and energy products. It also helps students to learn about alternative sources of energy such as solar energy and nuclear energy.

Finally, students will explore ways to take care of basic energy sources and their transformation, focusing on how they can affect the transformation process.

Objectives

1. Students will be aware of the many ways that energy comes to us and how it is used (Lesson One).
2. Students will know the concept of energy transformation (Lesson One.)
3. Students will know how food produces human energy and how the use of food as an energy source affects their use of human energy (Lesson Two).
4. Students will know the processes of transforming sources into energy and energy products (Lesson Three).
5. Students will know the processes of transforming non-human energy sources into energy and energy products (Lesson Four).
6. Students will know how solar and nuclear energy can be used as alternative energy sources (Lesson Five).
7. Students will rate energy conservation as a high priority in their everyday lives (Lesson Six).
8. Students will develop habits of energy conservation based on their knowledge of energy sources (Lesson Six).

LESSON 1-1: ENERGY COMING AND GOING

Rationale

It is important to know about how energy and energy products are made. The transformation process in itself is important. Those who wish to save energy can do so by understanding important ways that energy sources are transformed into energy and energy products.

This lesson focuses on awareness of how energy is processed or transformed. It also teaches an important concept, that of transformation. This concept will help students add to their knowledge about energy and energy products and apply knowledge to their everyday lives.

Objectives

1. Students will be aware of the many ways that energy comes to us and how it is used. Assessment of this objective can be obtained by studying students' responses to the summary discussion in Activity H.

2. Students will know the concept of energy transformation. This objective can be assessed by students' responses to Activity D in this lesson, or Assessment Activity 1-1 at the end of this chapter.

Main Activity

A. Begin this lesson by helping students to think about something that is actually transformed from a raw resource into a product and then used. They need not learn these terms at this time. You might want to discuss with students the making of something like oatmeal cookies. Normally people make cookies from ingredients, such as oatmeal, flour, and eggs. They use a recipe which tells them what to do in order to combine those ingredients (or process them) in a way they become a product, the oatmeal cookie. The oatmeal cookie is also used for human energy.

Oatmeal Cookies (Moist)

1 1/2 cups brown sugar (or part honey)
1/2 cup shortening
1 1/2 cups oatmeal
2 eggs
1 tsp. soda dissolved in 1/4 cup hot water
1 1/2 cups whole wheat or white flour
1/2 tsp. salt
1/2 tsp. cinnamon
1 cup raisins boiled in a small amount of water

Mix shortening, sugar, and eggs thoroughly.
Add oats, dry ingredients, and soda. Add raisins.
Drop by teaspoonfuls on cookie sheet. Bake at 350°
for 15 minutes.
Makes approximately two and one-half dozen.

Talk with students about the oatmeal cookie example. Ask students the following questions.

1. What ingredients are used in making oatmeal cookies? Where are these ingredients normally found? (Ingredients are oatmeal, brown sugar, flour, raisins, eggs, etc. They are normally found in the grocery store, or in the kitchen of someone's home.)

2. What energy is used to make cookies out of these ingredients? (Human energy is used as well as electric energy or natural gas energy.)

3. What product is made as a result? (The product in this case is the oatmeal cookie.)

4. How is the product used? (We normally eat it, either quickly or over a longer period of time. We use it for energy to play, learn, etc.)

B. Tell students that the process of transforming energy is much like the process of making oatmeal cookies. There are ingredients, or sources of energy. We work with those sources in order to make energy and energy products, such as lighting or heating. We then use that energy or energy product in various ways. Ask students to list what energy ingredients or sources they are familiar with. The list should include coal, oil, water, wind, solar energy, and others that students can think of. Make the list as comprehensive as necessary to meet the needs of the students. We merely want students to be aware of vast arrays of energy sources which are available to be transformed into energy and energy products.

C. Ask students to find a set of pictures in magazines, newspapers, and other places, which show energy sources. When students have selected their pictures, discuss with students in class and identify sources on their list that correspond with the pictures.

D. Now ask students to look again at their list and ask them how these sources are transformed in order to make the energy and energy products that they see around them every day. Talk with students about how coal, for example, is found in the ground. It is an energy source. It is mined, and then transported via trucks or rail to processing plants which transform coal into electrical energy or use it for heating purposes. Again, it is not important for students to know the exact transformation process at this point, but to select a few energy sources from their list and to know that a transformation process does exist which involves the transformation of the source into the energy and energy products that they see in their homes, community, or school.

E. Ask someone (such as a parent involved in energy production) to come into the classroom and talk about energy or an energy product that the students are interested in. Have that person describe, for example, how coal or oil is transformed into energy and energy products, and how it is used in their community.

or

Have students do a survey of their classroom, school, or homes. Have them determine one of the energy products in these places, and have them study how this product came into their homes or school or classroom.

F. Now talk with students about how the transformation of energy sources into energy and energy products. Energy products are all around us, from the pens and pencils we use to write with and the paper we write on, to the lights we use to see by and the heat which keeps us warm. Have students do another list of the energy and energy products that they use every day and that are commonly used by people in the United States. Then talk with them about their original list of sources and their list of energy and energy products, using the following questions.

1. What energy sources are the base for the energy and energy products that you have listed?

2. How generally are these sources transformed into energy and energy products?

3. Why is it important to have this energy and these energy products?

G. Now talk with students about how energy and energy products are used. Oil is an energy source transformed to gasoline which, for example, is used for cars, home heating, and other activities. Make a list with students of the major ways they have used energy and energy products in their school, homes, and/or community.

H. Put the word "transformation" on the board. Ask students to summarize the way energy sources are transformed, and energy and energy products are used. Have students take several of the energy sources that they listed in the beginning of this lesson and trace the process of transformation. You should see that students understand the concept of transformation and how important it is to understanding energy use.

Grade Level Adaptation

K-1: Have students use cookies and many other examples of how something is transformed from one form to another. Then take one form of energy with which you are familiar and talk with students about that process of transformation.

2-3: Gather pictures of several energy sources, and do the lesson in terms of those pictures you have gathered.

Language Arts Adaptation

K-1: Have students do something, like make oatmeal cookies, to see how the transformation process is done. Otherwise, you might have them act out the making of cookies or some other activity which requires the transformation of a source into energy and energy products.

2-3: Have students read stories in available books about the transformation of a source into energy and energy products.

4-6: Have students write a play about one energy source, how it is transformed into energy and energy products, and how they use them every day.

Math Adaptation

K-1: Use the recipe with this lesson to teach students about differences in measures such as cups and half-cups, and teaspoons or half-teaspoons.

2-3: Ask the students to compute the volume of dry measure in cups in the recipe (including brown sugar, shortening, flour, oatmeal, raisins).

4-6: Ask students to compute the percentage of oatmeal, sugar, and raisins that are in their oatmeal cookie recipe. You may use fractions if you are currently teaching them.

LESSON 1-2: HUMAN ENERGY

Rationale

Students now understand the word "transformation." Here they will see how energy sources are transformed to make human energy. The chief source of human energy is food. One measure of the amount of energy produced by food is calories. Students will learn about how calories are an important part of human energy which allow us to do things every day.

It is important that students learn about the transformation of food into human energy and that they know how to take care of this energy. Taking care of human energy will help them to do more. It will also help them to perform better when they do activities. It is the key to the development of effective energy actors.

Objectives

Students will know how food produces human energy and how the use of food as an energy source affects their use of human energy. Teachers can assess the attainment of this objective through students' responses to Activity G in this lesson or through Assessment Activity One at the end of this chapter.

Main Activity

A. Review with students how human energy is body energy. Talk with them about what they think they need in order to have as much energy as they would like to have. Students should talk about how they need food and sleep and exercise in order to use the energy that they need to work and play on an every-day basis.

B. Now talk with students about how the chief source of energy they need is food. Discuss with them what they ate yesterday or the day before. Talk with them about how the food they ate is made from plants and animals. Plants and animals are contributers to our food supply. Our food supply can be called an energy source. Put the words "food source" on the blackboard and list under them all the food sources that students mention that they have eaten from the previous day.

C. Now use the calorie and food group charts (pictures 2-1 through 3) which are enclosed with this lesson to talk about a variety of food sources and how they contribute to our human energy. Calories are a measure of the energy that foods produce. Calories are used as we do things that we do every day. Have students go through the calorie chart and pick out food that they ate yesterday. Have them work in groups to answer the questions at the end of the chart. Students should see that they need an average number of calories in order to have energy for one day, that people have different amounts of calories that they take in every day. Some foods supply many more calories than others. The number of calories that you take in has a relationship to the amount of human energy that you have. However, some foods provide you with more energy than other foods. Everyone needs a balance of foods across the four food groups.

D. Now select one food on the list of food sources and/or on the list of students' food sources that they ate the day before. Talk, for example, about the oatmeal cookie. The oatmeal cookie is a food source. From it we get calories. We get proteins, vitamins, and minerals that help to produce energy for us to play games, work in the classroom, and do other things every day. Therefore, the oatmeal cookie is a source which is used to produce human energy which in turn helps us to do things every day. Human energy is the fundamental source we use to move ourselves and things, to think, and to express feelings toward other people. Have students discuss several of the foods on the list, talking about the sources that provide human energy and what we do with that human energy every day.

E. Now have students divide into groups and take a food or food group to study. Have them do some research on that food group and prepare an oral report about what food sources the food group contains, how these sources are transformed into human energy, and how that human energy is used every day. Have the class discuss the importance of the transformation process from food to human energy and how we use human energy on an everyday basis.

F. Now discuss with the students what would happen if we did not have enough food sources. Talk with them about how they could not do many activities every day. Have them list the activities that require the most energy and think about what life would be like if they could not do those things. Now talk with students about what would happen if we ate too much food. Taking in too much food can have the same effect as not having enough. The body can become weak and tired from its own work and all the energy is used to keep the body going. Therefore people cannot do very many things. Stress with students how important it is that they take care of their human energy by eating the proper amounts and kinds of food--not too little and not too much from each of the four food groups--and by using it every day to think and express feelings and move things.

G. Now have students develop a plan for how they might take care of their human energy. They should develop plans which involve the kind of food intake that they need, the sleep and exercise that they need. The plan should also show how these activities have effects on what they can do, on their emotions, and on how they think. They should present these plans orally in class, and students should see the variety of ways in which food is used to produce human energy, and then how that energy is used. They should see that it is as important to plan the use of human energy as it is any other type of energy.

Grade Level Adaptation

K-1: Ask students about what they have eaten on the previous day. Have them draw pictures of those foods. Talk with them about what they need to eat in order to be able to play a game that they are familiar with which requires a lot of energy.

2-3: Have students count the calories that are involved in two or three different menus. Have them plan menus which involve the intake of the appropriate number and amount of food sources.

Language Arts Adaptation

K-1: Ask students to use puppets in order to illustrate different foods and their values for energy use. One student might be a carrot; another student might be a cookie. They might play out different roles with their puppets in terms of what the food is and what it is used for in order to help them understand the relationship between food sources and human energy.

2-3: Have students draw up a variety of menus and plan ways they can take care of their human energy. They should develop picture menus and use words along with them, depending on which language arts skills you are teaching.

4-6: Ask students to make an oral presentation on their plans for taking care of their body energy. Have them use any of the basic language arts skills you are currently teaching.

Math Adaptation

K-1: Teach students about the variety of measures that are used to measure food--cups, pounds, etc. You may want to make them familiar with a whole variety of measures and weights of foods as an adaptation for this lesson.

2-3: Ask students to count the calories that they use for a day or for a week. Have them combine, work in groups, and determine how many calories the group is consuming on a regular basis.

4-6: Have students form class totals of the amount of calories that they use in a normal day. Have them find the average calories used by a person in the class. You may want them to graph their calorie intake for a few days or a week.

FOOD SOURCES

The source "food" can be measured in calories. Different foods contain different amounts of calories. The body "burns" the food that is eaten much as gasoline is burned in a car engine. Some types of foods will "burn" longer than other types. Foods providing the most energy are foods containing carbohydrates or fats. You will find a number of these foods in all good groups. The groups that supply the largest amounts of energy are Group 4 and fats and oils, miscellaneous. Second would be Groups 1 and 2, and group 3 would provide the least amount of energy.

Group 1: Milk and Dairy Products

Milk - Skim (1 cup)	75
White (1 cup)	159
Chocolate (1 cup)	213
Ice Cream (1/2 cup)	162
Cheese (1 oz.)	120
Yoghurt (1 cup plain)	152
Milk Shakes (1 cup)	300
Eggnog (1 cup)	280
Cream (1 tbl.)	50
Whipped Cream (1 tbl.)	50

Group 2: Meat, Poultry, and Fish

Hamburger (4 oz. meat only)	303
Steak (3 Oz.)	255
Roast Beef (2 oz.)	140
Pot Roast (3 oz.)	250
Bacon (2 slices)	125
Pork Chops (1 - 3 oz.)	285
Pork Cutlets (1 oz.)	285
Pork Steak (1 - 3 oz.)	330
Roast Pork (3 oz.)	285
Ham (2 oz.)	230
Sausage (pork - 1 pattie)	170
Liver (3 oz.)	175
Chicken (3 oz.)	165
Turkey (3 oz.)	210
Fish (4 oz.) baked or broiled	115
fried	235
Tuna (2 oz.)	140

Group 3: Fruits and Vegetables

Apples (1)	85
Oranges (1)	70
Grapefruit (1/2)	70
Tangerines (1)	60
Lemons (1)	25
Limes (1)	35
Pears (4 halves, canned)	85
Apricots (1/2 cup)	100
Nectarines (1)	25
Plums (1)	30
Grapes (1 cup)	100
Bananas (1)	100
Cherries (1 cup)	60
Cantaloupe (1 slice)	24
Watermelon (1 slice)	50
Strawberries (1 cup)	60
Raspberries (1 cup)	80
Cranberries (1 cup)	60
Prunes (4 medium)	70
Raisins (1 oz.-1/4 cup)	80
Dates (1 oz.)	80
Figs (3 medium)	60
Cauliflower (1/2 cup)	20
Green Beans (1/2 cup)	20
Green Peppers (1)	10
Brussel Sprouts (1/2 cup)	30
Eggplant (medium slice)	30
Zucchini (1/2 cup)	5
Carrots (1/2 cup)	30
Onions (1/2 cup)	30
Potatoes (1 medium)	120
Beets (1/2 cup)	60
Cabbage (1/2 cup)	20
Cucumbers (1 medium)	10
Peas (1/2 cup)	50
Broccoli (1/2 cup)	30
Squash (1/2 cup)	50
Mushrooms (1/2 cup)	30
Radishes (6)	10
Lettuce (half head)	10
Corn (1/2 cup)	90
Spinach (1/2 cup)	20
Bean Sprouts (1/2 cup)	20

Group 4: Breads and Cereals

Bread -	White (1 slice)	80
	Wholewheat (1 slice)	55
	Rye (1 slice)	60
	Pumpernickel (1 slice)	60
	Pita (1 slice)	120
Buns -	Hamburger (1)	100
	Hotdog (1)	100
Bagels (1)		100
Tortillas (1)		50
Muesli (1/4 cup)		70
Granola (1/4 cup)		110
All Breakfast Cereals (1 cup dry)		105
Oats (1 cup)		200
Bran (1 cup)		100
Rice (1 cup)		200
Barley (1 cup)		100
Tapioca (1 cup)		120
Grits (1 cup)		110
Cream of Wheat (1 cup)		110
Crackers (1)		25
Macaroni (1 cup)		170
Spaghetti (1 cup)		170
Popcorn (1 cup)		25

Fats and Oils

Butter (1 tbl.)	110
Margarine (1 tbl.)	110
Peanut Oil (1 tbl.)	110
Sunflower Oil (1 tbl.)	130
Crisco (1 tbl.)	130
Lard (1 tbl.)	150
Salad Dressings (1 tbl.)	100
Mayonnaise (1 tbl.)	100

Miscellaneous

Sugar - White (1 tbl.)	55
Brown (1 tbl.)	55
Confectioner's (1 tbl.)	55
Honey (1 tbl.)	55
Jellies	25
Jams (1 tbl.)	25
Popsicles	80
Candy Bar (1)	150
Gum (1 stick, sugar)	90
Pop (1 can)	150
Coffee, black	0
Tea, plain	0
Koolaid (1 cup with sugar)	65
Lemonade (1 cup with sugar)	107
Catsup (1 tbl.)	15
Vinegar	0
Worchestershire Sauce (1 tbl.)	15
Mustard (1 teas.)	10
Pancake Syrup (1 tbl.)	55
Molasses (1 tbl.)	90

Questions

1. What is the total number of calories that you consume from each of the food groups listed?
2. Is your total the same as your classmate's total?
3. Which foods on your list provided you with the most energy?
4. In what way could you alter your diet in order to produce more human energy from these food sources?

LESSON 1-3: NON-HUMAN ENERGY

I: Fossil Fuels

Rationale

Our purpose here is for students to see how non-human energy sources are an important part of their everyday lives. Non-human energy sources are transformed in a variety of ways in order to make energy and energy products that students have learned about in these materials. Often, as much energy is used in making energy and energy products as is actually used in their use. Therefore, the transformation from energy sources to energy and energy products is an important process for students to know about.

Objective

Students will know the processes of transforming non-human energy sources into energy and energy products.

Main Activity

A. Discuss with students how energy or a common energy product is the result of a transformation process. You might want to talk about gasoline as energy or an energy product. Many high school students either use it or are aware of its use on an everyday basis. Basically, gasoline comes from oil. Oil is extracted from holes drilled in the ground. Approximately half of our oil comes from the Middle East. It is then processed into gasoline by plants either in the Middle East or in the United States. This process requires the use of energy such as heat and human energy. The gasoline is then used as fuel for cars. This entire process of transformation from the energy source oil into gasoline requires a great deal of human energy as well as physical energy in processing. Therefore, students should see that a common product that they use every day is transformed out of raw energy sources and a great deal of energy is used in that process.

B. Now use the pictures that are enclosed with this lesson to inform students about common energy sources that are transformed into energy and energy products. Students should be able to see that there are three energy sources that undergo such transformation found under the earth. These three are called fossil fuels. They are oil, coal, and natural gas. Generally these three sources are extracted and then transformed into energy products. It is important for students to understand that fossil fuels are energy sources. Discuss the shortages of fossil fuels and their non-renewable nature.

Picture 3-1: Oil. Oil is extracted from holes drilled in the ground and is then transformed into energy and energy products. There is oil in most of the clothes that we wear, most of the plastic material that we use, as well as in a fuel that we use for cars and other means of transportation.

Picture 3-2: Coal. Coal is a basic fossil fuel. It is mined from the ground and then transformed into fuel for many industrial furnaces, homes, and other products. Coal is also used as the base for making electricity and other energy. In Indiana, for example, coal is the major source for much of the electricity which lights homes.

Picture 3-3: Natural Gas. Natural gas is extracted from holes drilled in the ground. It is then used as heating fuel for many homes and industries. Many students in the class, for example, may have gas stoves. The gas was originally extracted from below the earth.

C. Bring in someone from your area who deals in oil, coal, or natural gas as a source of energy. Have that person talk about how the source is processed into energy and energy products that are commonly found in the students' classrooms and homes.

D. Divide students into groups and ask them to gather evidence about the transformation process of different energy sources. Have them trace the energy product to its source and indicate ways in which energy is used in the transformation process used in producing the energy or energy product. Students may wish to compile their reports in written form and/or present them orally with visuals and graphics for the class.

E. Ask students to bring in one product which is made from fossil fuels. Have them discuss the way in which this product was transformed from its energy source into the energy product that the class sees in front of them.

F. Ask students to think about one product which they could save more than they do at this point. Have them devise ways for saving the product and have them try it for a period of time. Ask them to report to you or to the class about their success in conserving this energy product.

Grade Level Adaptation

K-1: Bring in pictures of three energy products which are derived from the three fossil fuels. Use the pictures to talk with students about where the products come from.

2-3: Have students bring one object to class. Have them trace the roots of that object or energy product, and use their products to explain how products can be made from fossil fuels and how the transformation process uses energy.

Language Arts Adaptation

K-1: Ask students to draw their own pictures of energy products and to talk about where these products came from.

2-3: Ask students to draw their own pictures and to develop captions on the pictures which explain how their pictures depict energy products and their sources.

4-6: Ask students to develop a script in which they explain how energy products in their school are made from energy sources which are then transformed into energy products.

Math Adaptation

K-1: Bring in some oil or coal. Have students measure the weights of each. Use this in order to teach them about different types of volumes.

2-3: Have students survey the objects in their class and categorize them into products which are made from the three fossil fuels.

4-6: Have students do research and find out how much of each fossil fuel (oil, coal, natural gas) the United States uses each year. Then have students compare the three amounts by determining fractions of the total use.

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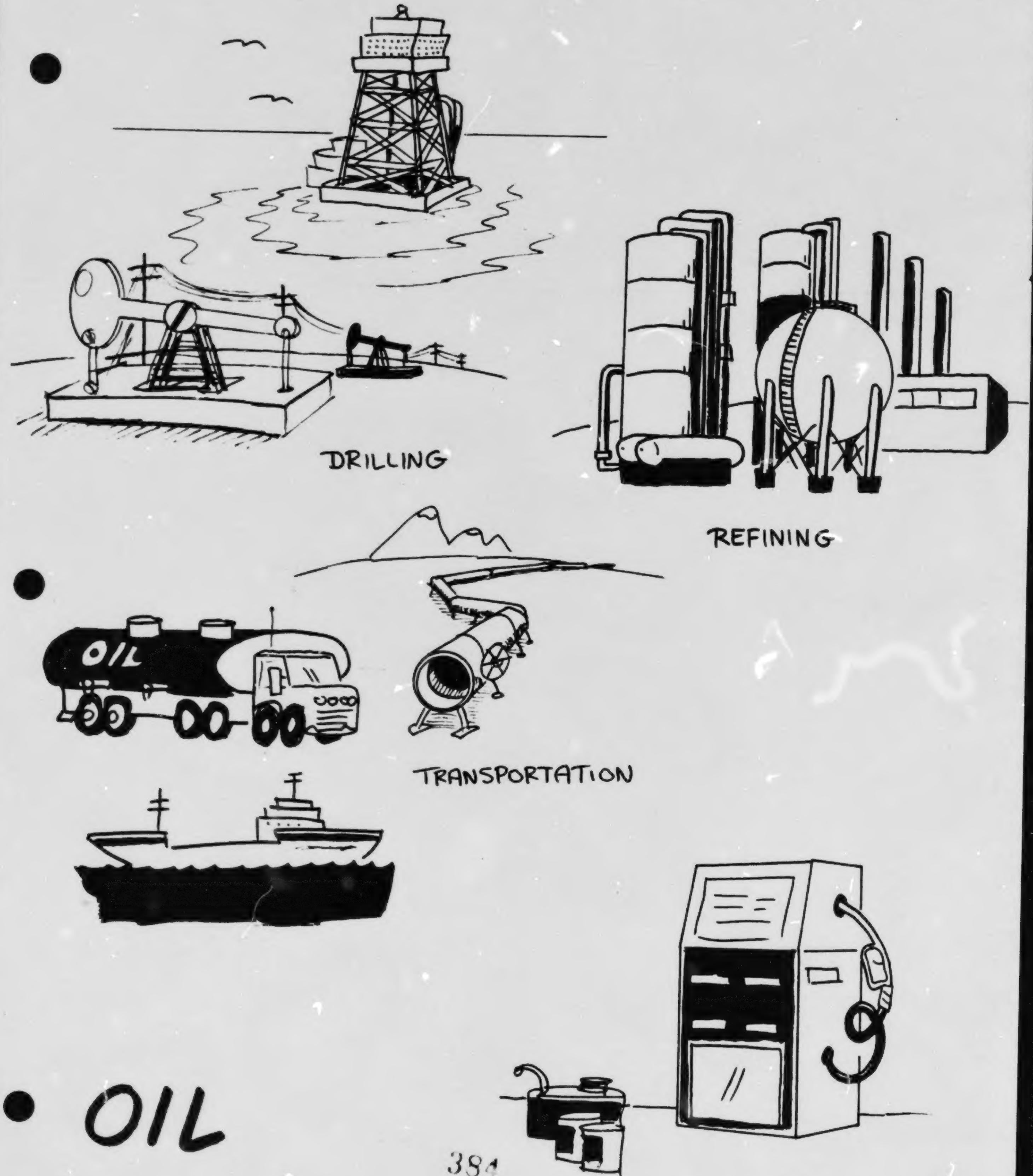
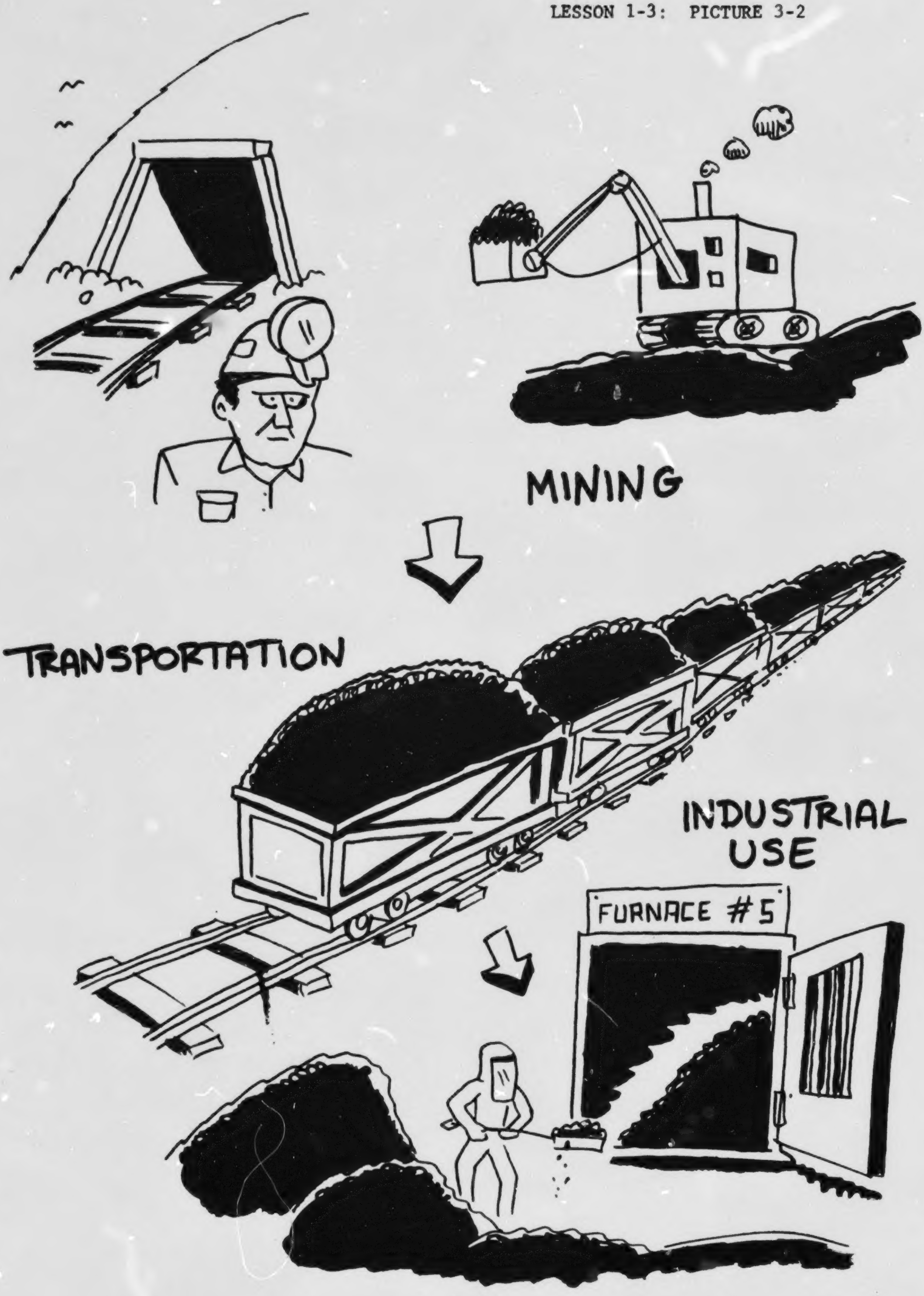
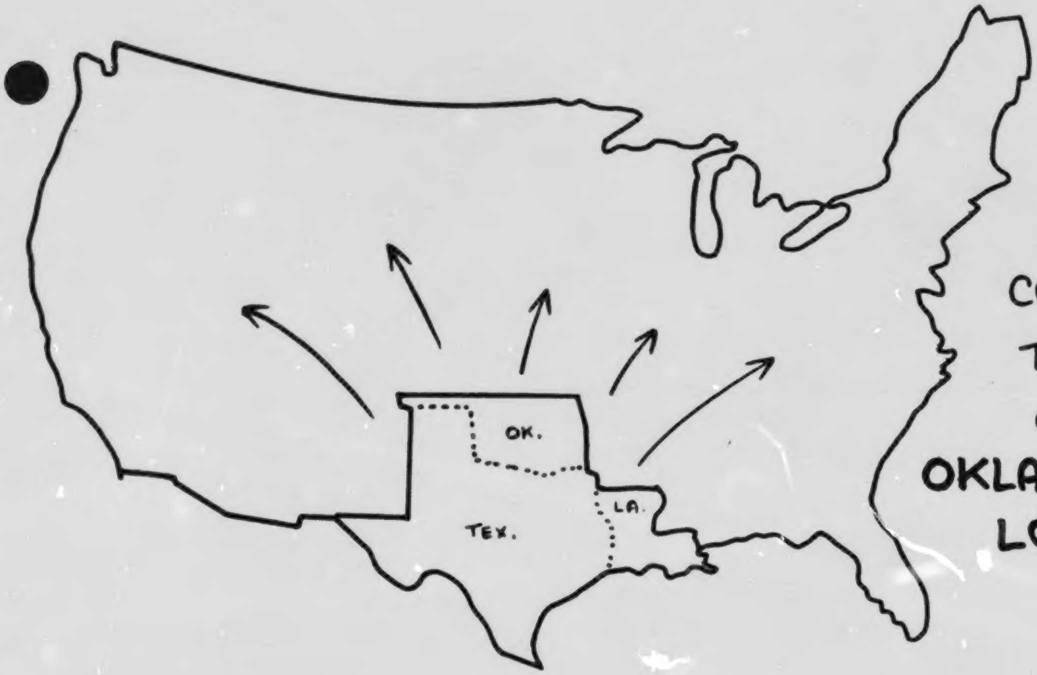

OIL
DRILLING
REFINING
TRANSPORTATION
SALES
OIL

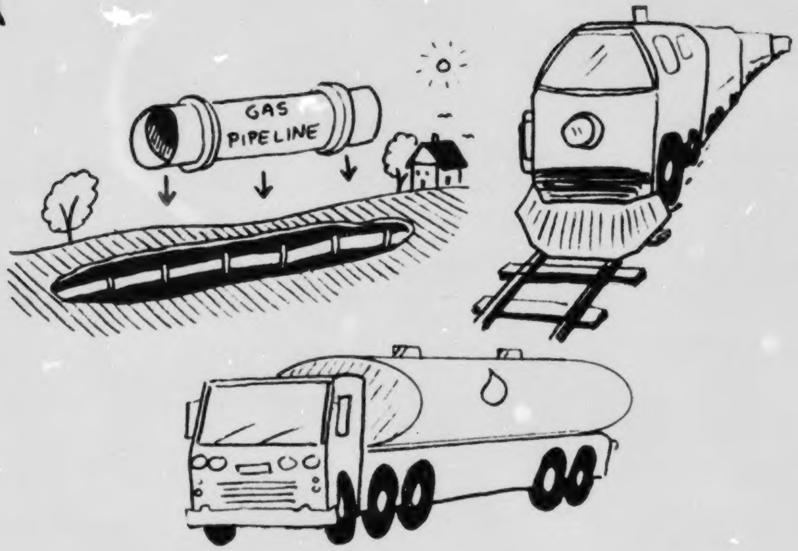

MINING
TRANSPORTATION
INDUSTRIAL USE
FURNACE #5

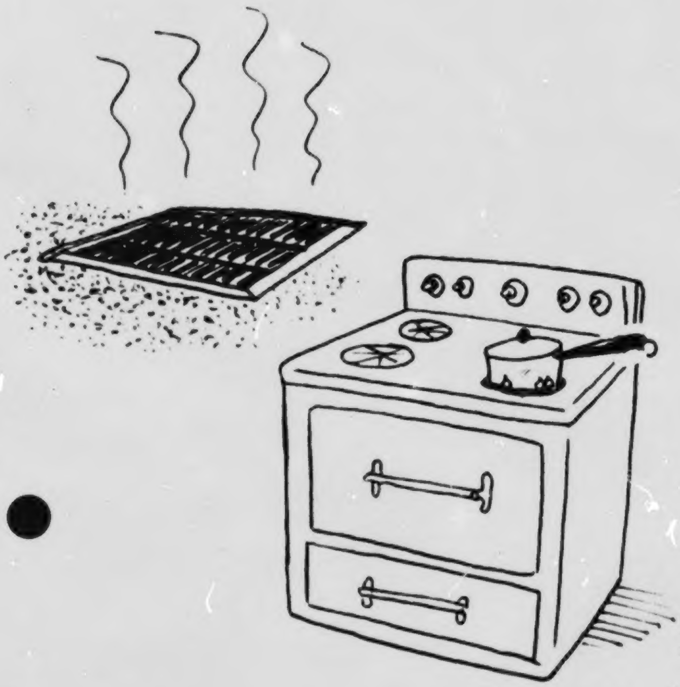
LESSON 1-3: PICTURE 3-3



MOST OF OUR GAS COMES FROM THE STATES OF **TEXAS**, **OKLAHOMA**, AND **LOUISIANA**...

...AND REACHES US BY PIPELINE, TRAIN, OR TRUCK...





... WHERE WE USE IT FOR SUCH NECESSITIES AS HEATING AND COOKING!!

LESSON 1-4: NON-HUMAN ENERGY

II: Wind, Water and Wood

Rationale

Students have learned about how non-human energy sources can be found inside the earth and transformed into energy and energy products. We will now look at non-human energy sources that are found on the earth, namely wind, water, and wood. Plants and animals are also sources of energy but we will not be concerned about them here because we have talked about them in Unit I. Many of the energy and energy products which are found on the earth are also used in the transformation process. Therefore, students will be concerned about both the sources of energy and the transformation process which makes energy and energy products.

Objective

Students will know the process of transforming non-human energy sources into energy and energy products. Teachers can assess the attainment of this objective through students' responses to Activity E in this lesson or through Assessment Activity Two at the end of this chapter.

Main Activity

A. Talk with students about wood as one non-human energy source that is found on the earth rather than in the earth. Explain to students that other sources include wind and water. Wood is an important energy source. It is used to make a large number of energy products, including furniture, logs for heating, braces, and other materials which secure houses, industries, and materials (like fences). It is also used directly for heat energy. Have students speculate about how wood is an energy source and what energy and energy products are a result of its transformation. Talk with them about how energy is used in the process of transformation as well as in the product.

B. Now use the pictures that are enclosed with this lesson to talk with students about the three different types of energy that are found on the earth and that are used to make energy and energy products. Students should be able to see how wood, wind, and water are energy sources and how they are used to make energy and energy products.

Picture 4-1: Wood. Wood is a popular energy source. It is found in trees and processed in a variety of ways to make paper, furniture, logs which are used for heating, and other materials. Both human and non-human energy are used in transforming wood from trees into useful wood products.

Picture 4-2: Wind. Wind is a powerful energy source. It can be used to move windmills or other objects which can make electricity. Sometimes wind can be harnessed easily and cheaply through windmills.

Picture 4-3: Water. Water is also used to make energy and energy products. Water can be stored in reservoirs and used to turn turbines to generate electricity. Water is used in this way throughout the United States.

C. Ask someone in your community who is connected with the use of wood, wind, or water energy or energy products to come and visit the class, or have students visit a place where wood is used as a major energy source or where wood products are made. They might want to visit a place where wind is used or where water is generated into electricity. From the discussion in their visits or by the visitor, students should understand that energy sources are transformed into energy and energy products. Energy is used in the process of transformation as well as in the use of the product itself.

D. Help students to construct an experiment to harness wood, wind, or water. They should be able to see how this energy source is used in order to generate energy of one type or another. Through a sample experiment, students can see how any of these sources can be used to help people to move things or to heat or light their classroom.

E. Divide students into groups and ask them to take one energy product which they use every day. They ought to be able to trace it back to its source and to determine what wood, wind, or water sources are used in making the energy product. They should make a report to the class.

F. Ask students to take one product which is the result of the use of wood, wind, or water that they think they can conserve. Ask them to experiment with saving on that product and to report back to the class their success in energy conservation.

Grade Level Adaptation

K-1: Bring in some wood products and use these as a base for explaining to students how wood serves as an important energy source.

2-3: Take the students on a visit to a place which uses these energy sources of wood, wind and water and transforms them into energy products. Discuss with students how energy sources become energy products using these basic categories of wind, wood, and water.

Language Arts Adaptation

K-1: Ask the class to form a collage of different wood, wind and water sources. Have them label each source in their collage.

2-3: Ask students to develop a diorama showing where wood, wind, or water sources are found and how energy is created.

4-6: Ask students to develop poems about the use of wood, wind, and water sources and the need to conserve on these energy sources.

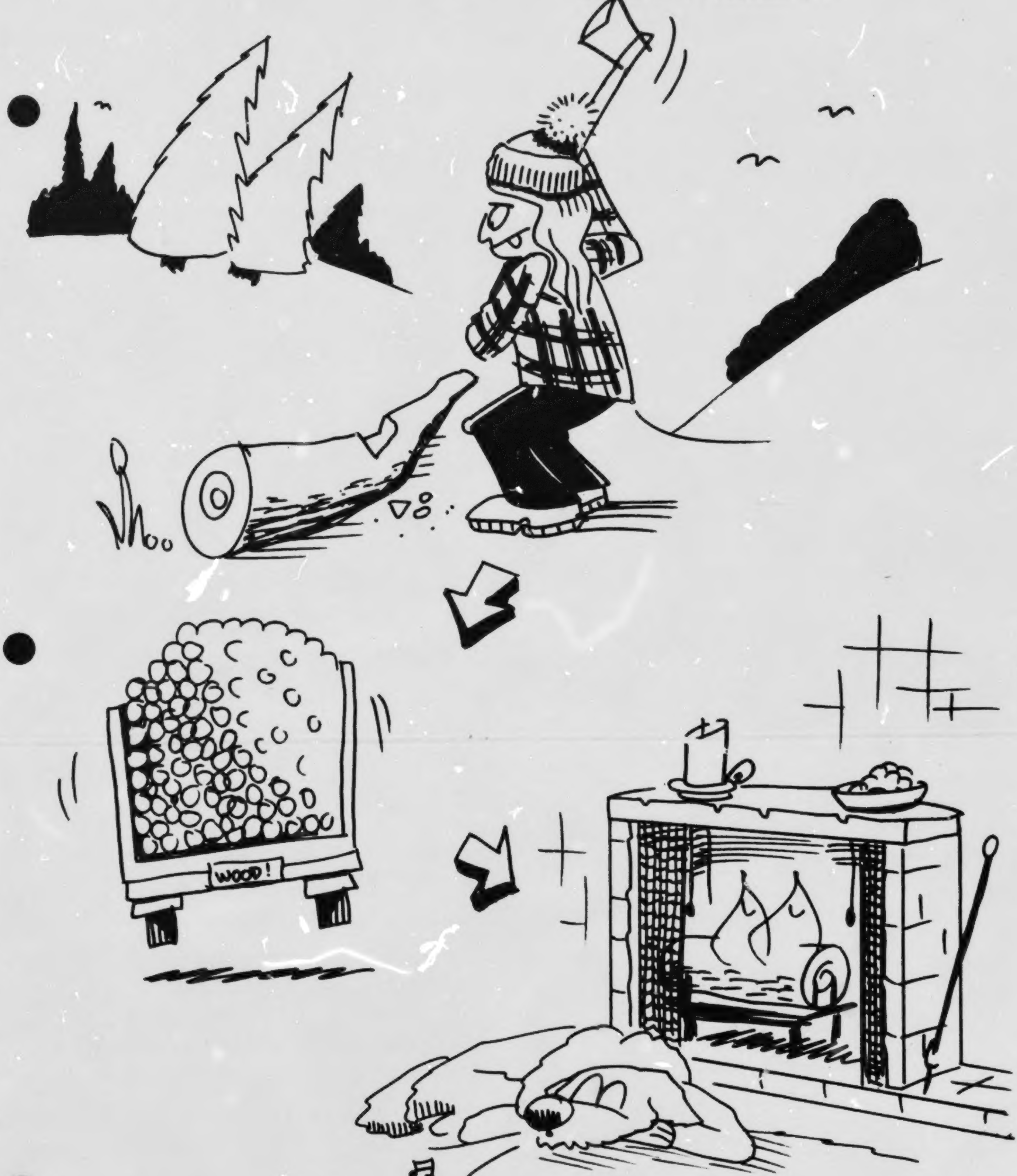
Math Adaptation

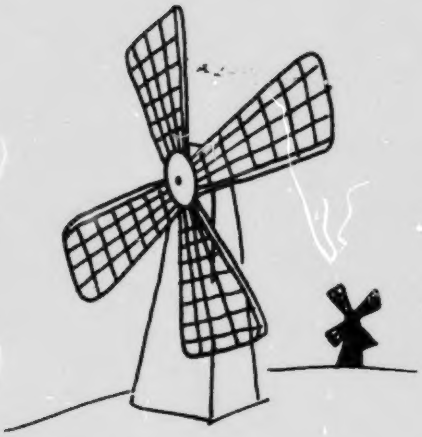
K-1: Have students count the wood products that are found in their classroom. Then have them count the products that are made with water. Have them determine which products they use the most and which they use the least.

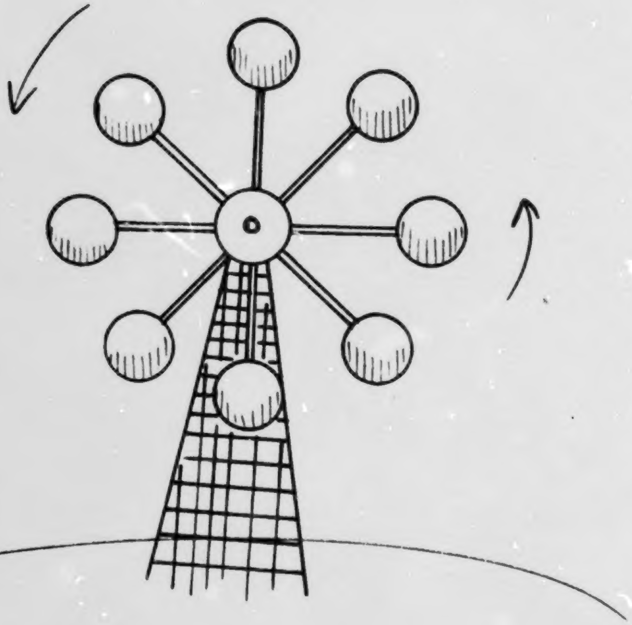
2-3: Have students determine the wood products which they use in their homes. Develop a class total for the number of wood products that are used; then ask students how they might conserve on these products and have them subtract the amount of wood that they would use if they undertook their conservation plans.

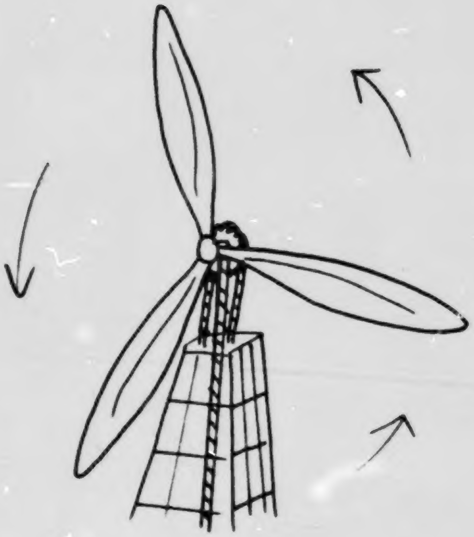
4-6: Have students collect information on the number of wood, wind, and water products they use on an everyday basis. Develop a class average for each category and determine how much could be saved through conservation measures.

LESSON 1-4: PICTURE 4-1

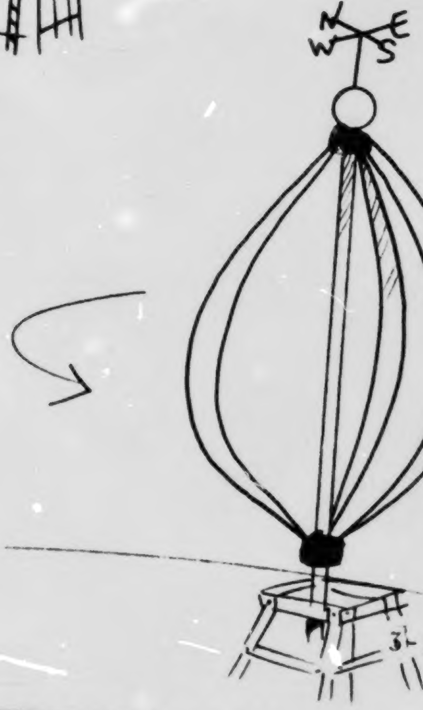


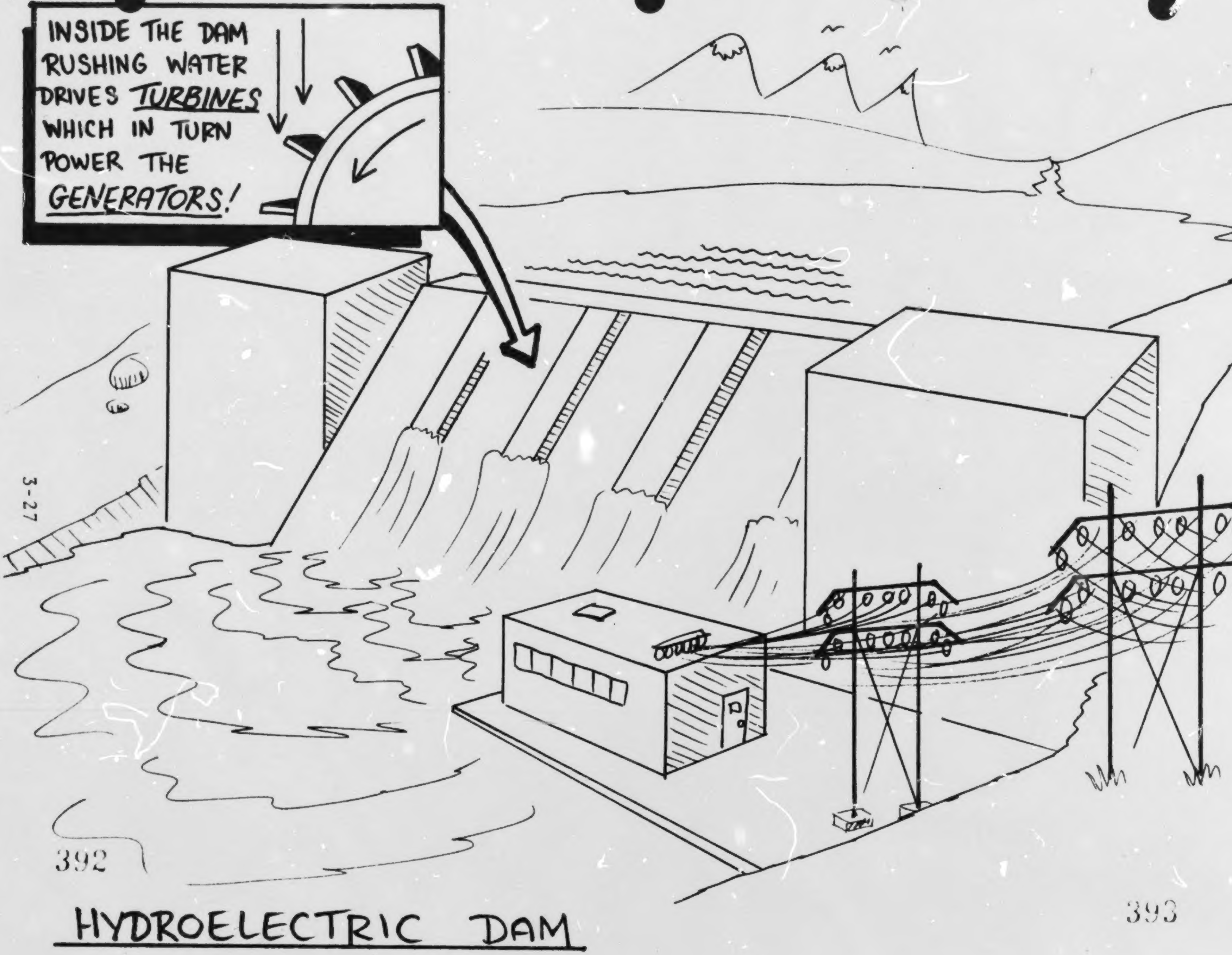






MOST OF US ARE FAMILIAR WITH THE "DUTCH" WINDMILL PICTURED ABOVE — BUT THERE ARE ALSO SEVERAL NEWER STYLES BEING EXPERIMENTED WITH. ALL OF THEM SERVE THE SAME BASIC PURPOSE — TO CONVERT WIND ENERGY TO MECHANICAL OR ELECTRICAL ENERGY!




INSIDE THE DAM RUSHING WATER DRIVES TURBINES WHICH IN TURN POWER THE GENERATORS!

3-27

LESSON 1-4: PICTURE 4-3

HYDROELECTRIC DAM

LESSON 1-5: ALTERNATIVE ENERGY SOURCES

Rationale

Just as students need to learn about human and non-human energy and its use, they also need to see alternatives. Using alternatives is one means of energy conservation. One way of coping with the energy problem is to explore the use of alternative sources of energy, such as solar and nuclear forms.

In this lesson students will explore solar and nuclear energy. They will see the pros and cons of these alternative energy sources and explore their local community to determine whether or not these sources are being utilized and can be utilized.

Objective

Students will know how solar and nuclear energy can be used as alternative energy sources. Teachers can assess the attainment of this objective through students' responses to Activity G in this lesson or through Assessment Activity Two at the end of this chapter.

Main Activity

A. Talk with students about how there are at least two important alternative energy sources being developed. They are solar and nuclear energy. Students should think about whether or not solar or nuclear energy is being used in their community, what uses can be made of them, and how they can help to conserve on scarce energy sources. In this discussion students should speculate about different ways they think that solar and nuclear energy can be used.

B. Use the pictures that accompany this lesson to talk with students about solar energy. Solar energy comes from a source -- the sun. It is then transformed through reflectors and used to heat air and water. In doing so, it becomes a home heating device. It can also be used in industry and can be used to make electricity. Talk with students about the pros and cons of using solar energy. Solar energy is cheap and totally renewable. We cannot use up solar energy in the same way we can deplete fossil fuels or other non-human resources. At the moment, setting up a solar energy system is expensive. However, we can also save money in terms of electric bills and other utility bills that we pay. The equipment often malfunctions. In many areas of the country people believe that the lack of direct sun rays make it too cold to effectively use solar heating units. Therefore, solar energy is an alternative, yet it does have problems.

C. If there are any solar energy units in your town, take students to visit those units and talk with personnel there. If there are not solar units, then have someone who knows about solar energy come in and talk to the class about how solar energy can be used and what its problems and opportunities are. Then have students hold a discussion over the pros and cons of solar energy as an alternative source.

D. After students have discussed the solar energy alternative, have them divide into groups and develop a dialogue which demonstrates the pros and cons of solar energy. Have them read their dialogues in front of the class and talk with students about the problems and opportunities of solar energy as an alternative source.

E. Now use the pictures in this lesson to talk with students about nuclear energy. Nuclear energy is made from the heat-generated fission (and perhaps soon the fusion) of atoms and is used to generate electricity. Generally, nuclear energy made in nuclear reactor plants. These plants are very expensive to build. Nuclear energy can be manufactured cheaply once the reactor plant has been constructed. The manufacture of nuclear energy is also a versatile process. Many different non-human energy sources can be used to make nuclear energy (i.e. uranium, plutonium, seaweed) so precious fossil fuels can be conserved. Nuclear energy plants can be a worry to the local residents due to possible reactions from radioactivity or malfunctioning of the equipment. Therefore, although nuclear energy is an alternative, it has problems as does any alternative source of energy.

F. If there is a nuclear reactor site near your community, have the students visit the site or have someone from the site come and visit the students and talk about nuclear energy and how it is made and transformed and what the problems and opportunities are of its use.

G. Divide students into small groups and ask each group to find some information about an alternative energy source which is not mentioned here. They could find information about tidal, or geothermal energy sources, or gas from waste materials. Ask the students to give their reports to the class.

H. Now ask students to make a plan about how they might use alternative forms of energy such as nuclear or solar energy. Have them describe how they would use the energy sources and what energy they could save in the process. If it is practical have students carry out their plans.

Grade Level Adaptation

K-1: Take students outside if it is a warm day. Show them how the sun helps to make them warm. Tell them that the sun is a source and use this example to explain to them how solar energy can be an alternate form for heating homes, classrooms, and other familiar places.

2-3: Collect pictures of solar and nuclear energy alternatives. Have students discuss the pictures and talk about how these alternatives could save on energy.

Language Arts Adaptation

K-1: Ask students to draw pictures of different ways the sun could help to heat their bodies or their homes. Have them explain the pictures to you after they have been completed.

2-3: Ask the students to write a short story about the sun and how it could help them to save energy.

4-6: Have students do a survey of the variety of ways solar energy can be used and the kinds of savings that can be made using this alternative.

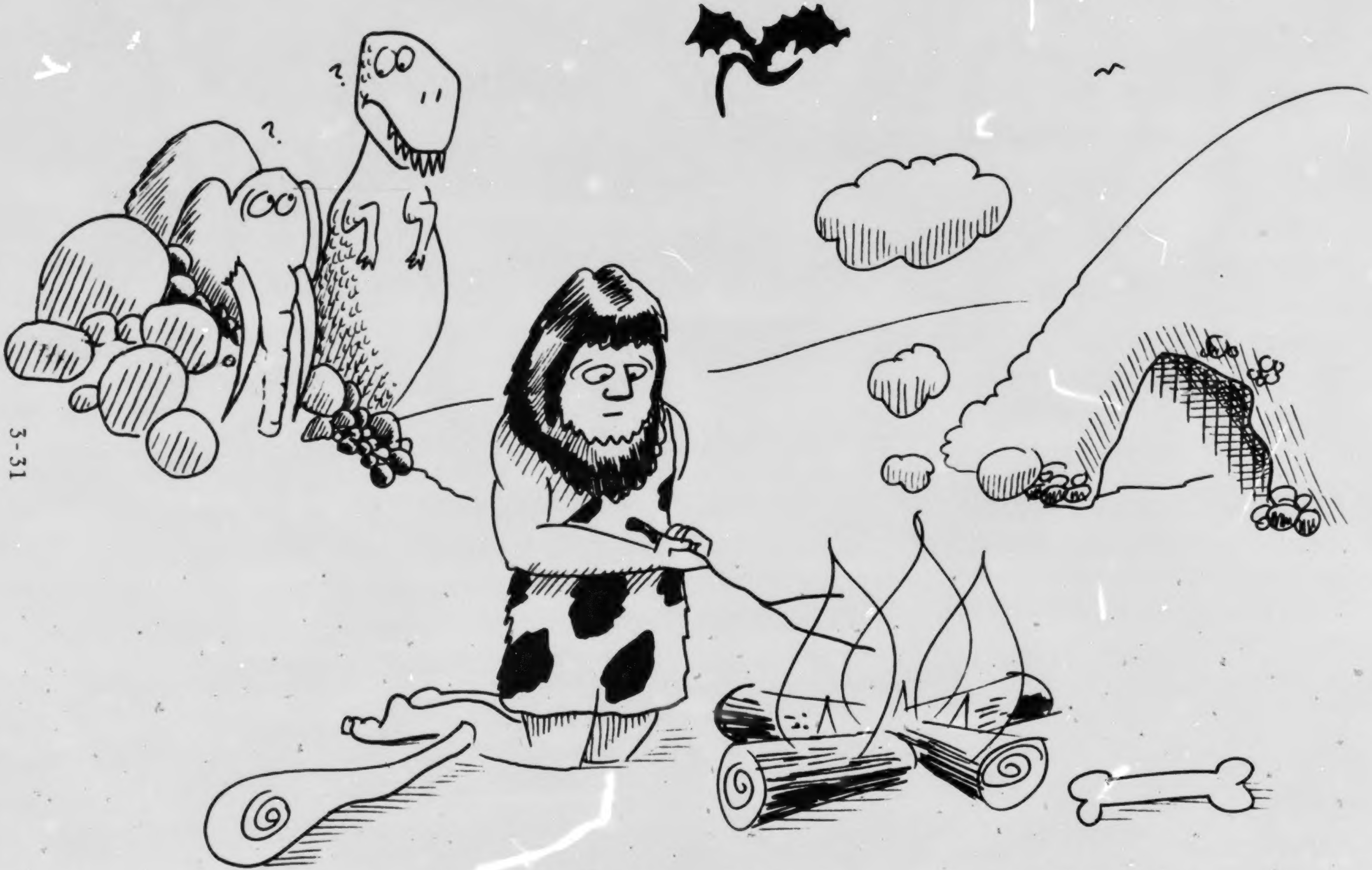
Math Adaptation

K-1: Ask students to sort things that they use every day into those that could use solar energy and those that must use other energy.

2-3: Ask students to sort the number of items that might be powered by solar energy. Have them add these items and subtract items for which they feel they could not use this alternative source.

4-6: Have students make a list of all the things for which they could use solar energy. Have them determine the percent of things that could use solar energy out of the total number of products they use every day. Have them determine how much they could save on energy by using this alternative.

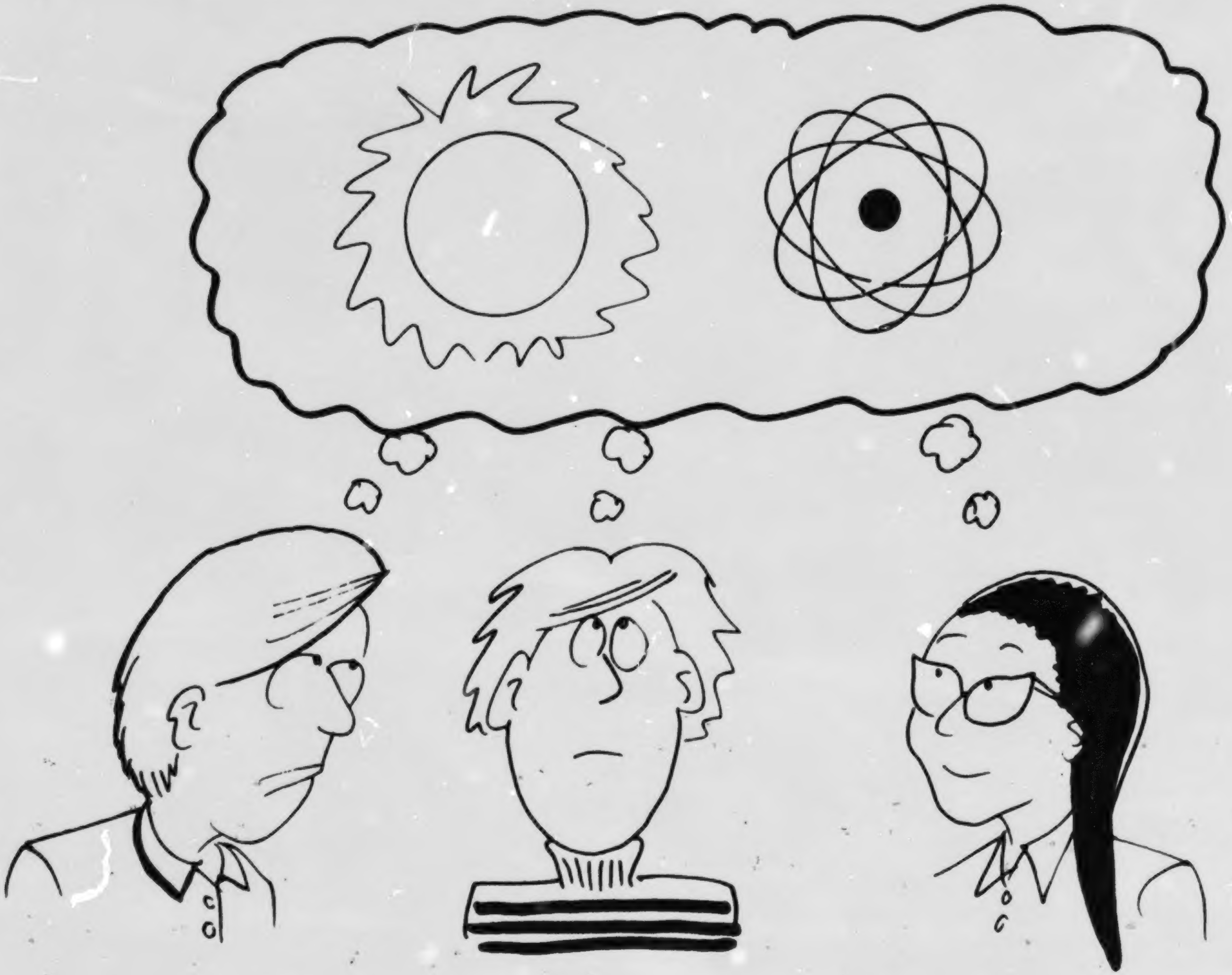
LESSON 1-5: PICTURE 5-1



ALTHOUGH SOME FORMS OF ENERGY HAVE BEEN IN USE FOR A LONG TIME....

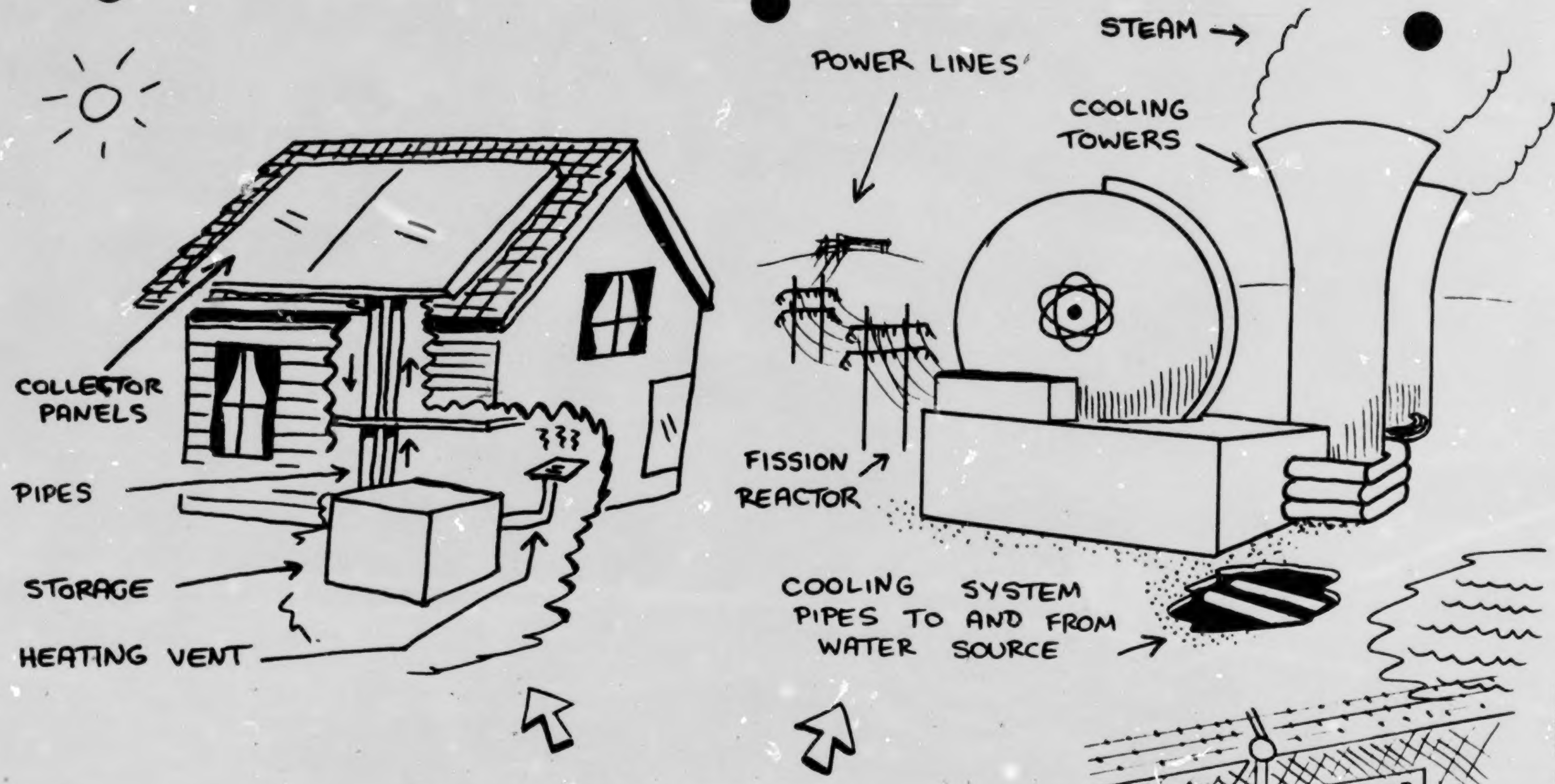
⇨

LESSON 1-5: PICTURE 5-2



... SOME OF THEM SEEM TO BE PRETTY NEW —— LIKE SOLAR ENERGY AND NUCLEAR ENERGY.

⇨

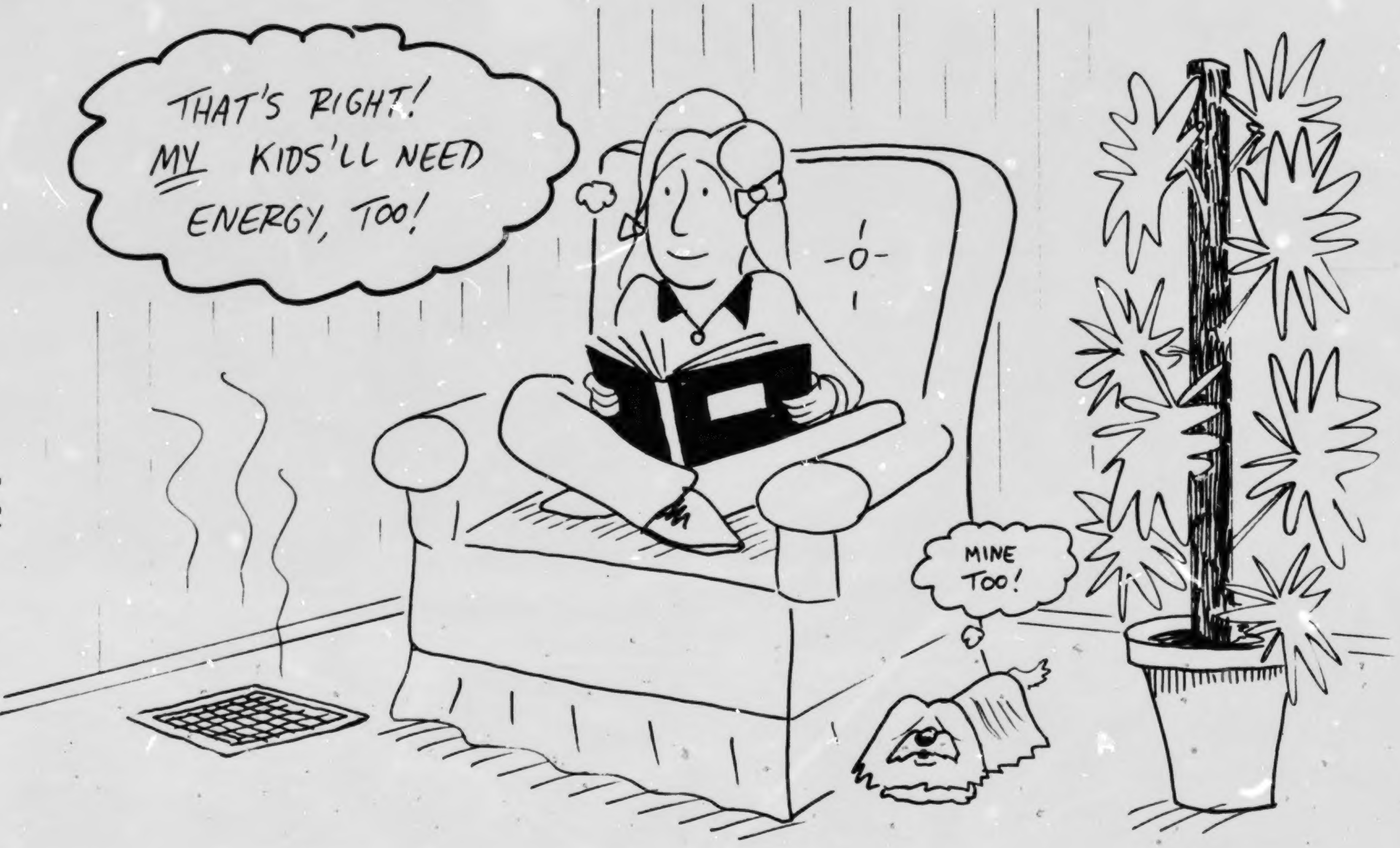

STEAM
POWER LINES
COOLING TOWERS
COLLECTOR PANELS
PIPES
STORAGE
HEATING VENT
FISSION REACTOR
COOLING SYSTEM PIPES TO AND FROM WATER SOURCE
DANGER

PROCESSES

NOW WE ALL KNOW THAT THE SUN ISN'T REALLY ANYTHING NEW, AND NEITHER ARE ATOMS — BUT THE PROCESSES OF GETTING ENERGY FROM THEM ARE! IT'S UP TO US TO USE THEM WISELY...

LESSON 1-5: PICTURE 5-3

LESSON 1-5: PICTURE 5-4


THAT'S RIGHT!
MY KIDS'LL NEED ENERGY, TOO!
MINE TOO!

... SO WE CAN HAVE SAFE, CLEAN, ENERGY —
AND PLENTY OF IT, FOR YEARS TO COME!!

LESSON 1-6: TAKING CARE OF ENERGY

Rationale

Students have studied different sources of energy and how they are transformed into energy and energy products. Here they will put their knowledge to use and learn how to take care of some of these energy sources. They will act based on their knowledge. This is an essential feature of becoming an effective energy actor.

Objectives

1. Students will rate energy conservation as a high priority in their everyday lives. Teachers can assess the attainment of this objective through students' reports in Activity E of this lesson.

2. Students will develop habits of energy conservation based on their knowledge of energy sources. Teachers can assess the achievement of this objective based on students' responses to Activity D in this lesson.

Main Activity

A. Help students to select one energy source and how it is transformed into energy and energy products. They should divide into small groups and each group should select one particular source that it is concerned about. Students should be aware that they will study this source and then develop a plan for energy conservation.

B. Now have the small groups meet and make a plan for how people could conserve on the energy source they have chosen. They should talk about the source and its transformation into energy and energy products in their plans and should develop at least three different ways that people could save on the use of energy sources, the transformation process, and/or the energy and energy products that result. They should present their plans to the class and the class should talk about the feasibility of what students have decided.

C. Now help students to gather evidence regarding their energy source and their plan for energy conservation. They should gather evidence from existing sources such as books or magazines. They should also interview at least one local person who has knowledge about the energy source and conservation measures. They should include this interview material in their decision-making about their plan for energy conservation.

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D. Students should then prepare a presentation about their energy source, the transformation process and its energy and energy products and their plan for conservation of this energy source. They should also present to the class the evidence they have gathered from community people who are knowledgeable about this source.

E. Students should give their presentations in class and then attempt to take or recommend action based on them. They might want to inform one other person of ways that they can conserve on this source or they might want to talk with an authority about the kinds of ways energy conservation measures can be undertaken in their school, home and/or community.

Grade Level Adaptation

K-1: Select one energy source and talk about it in class. Have students talk about energy or an energy product that they use in class which they could conserve.

2-3: Have students select energy sources and energy or energy products which are used in their school and make a plan for school energy conservation. They should present their plan to another class or to the proper school authorities.

Language Arts Adaptation

K-1: Have students use puppets to talk about how they might be able to take care of the energy source that they have studied in class.

2-3: Ask students to write a plan for how they might practice energy conservation one day in their class. They should then take various measures to conserve on energy for a single day in their classroom. You might want them to make oral reports on how they tried to conserve energy during that day.

4-6: Ask students to formulate a news article or a radio spot which highlights what they learned from taking care of energy in this lesson. You may want to have it published in the school or local newspaper or to submit it to radio personnel.

Math Adaptation

K-1: Talk with students about the time that it has taken them to conserve the energy source from this lesson. You can teach them about the amount of hours or days it has taken to do this activity.

2-3: Have students gather written evidence from a person in their community about school use of basic energy and energy products. Based on their conservation plans, have them subtract the amount of energy they might save by carrying out their plans.

4-6: Each group should determine the amount of energy that would be saved by its conservation plan. Students should then find the average amount of energy that will be saved by the class as a whole in carrying out their plans.

ASSESSMENT ACTIVITIES FOR CHAPTER 1

The following assessment activities are designed to review, reinforce and determine the basic knowledge the students have obtained from the lessons in Chapter One. They can be used immediately following the appropriate lesson, or at the end of the chapter.

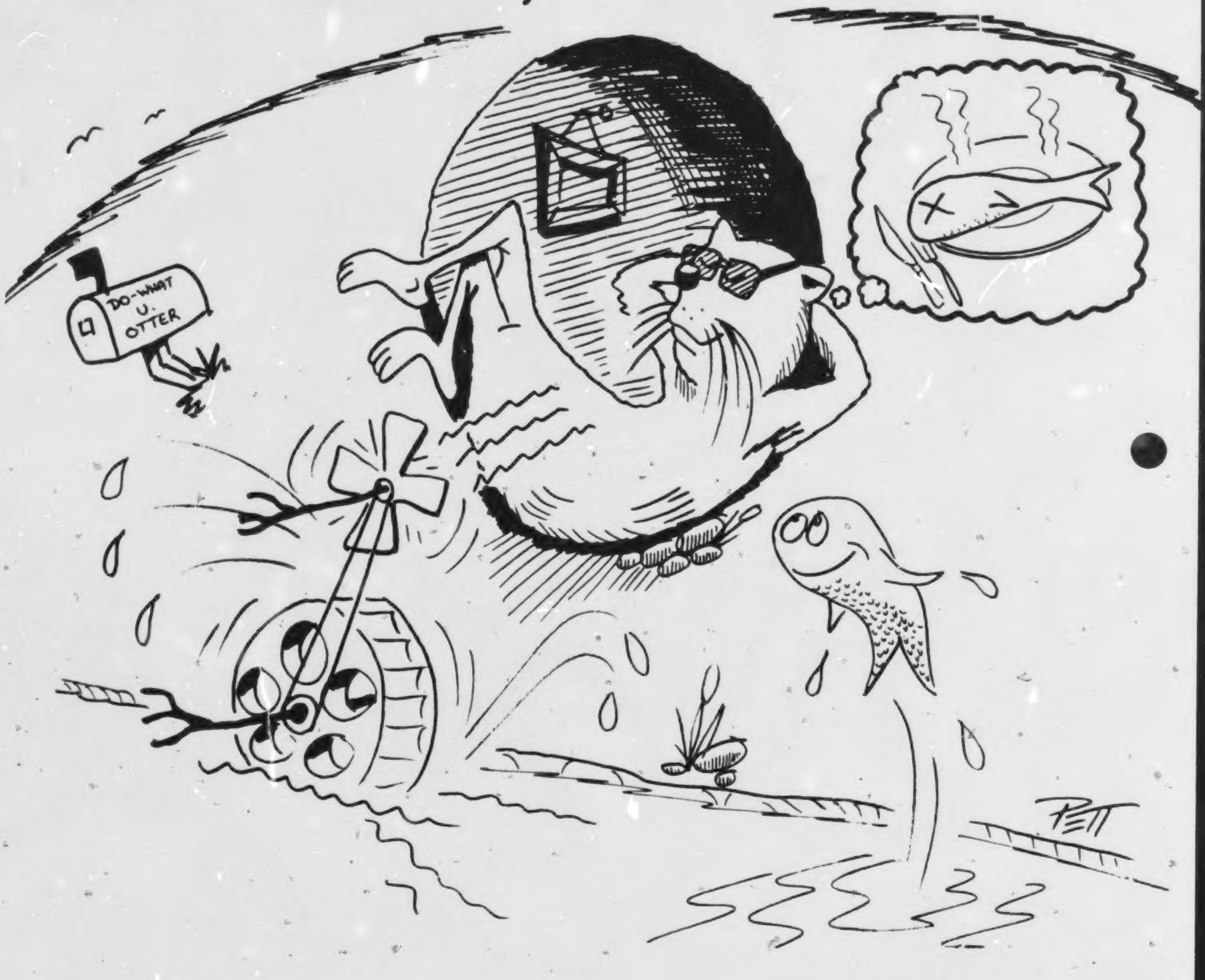
1. The first assessment activity is a set of limericks on the different forms of energy that have been discussed. The answers that belong to each limerick are:

   Limerick 1-1: water
   Limerick 1-2: nuclear
   Limerick 1-3: electric
   Limerick 1-4: solar
   Limerick 1-5: wind
   Limerick 1-6: coal
   Limerick 1-7: gas
   Limerick 1-8: person
   Limerick 1-9: oil

   The limericks could be given as an in-class activity as a homework assignment.

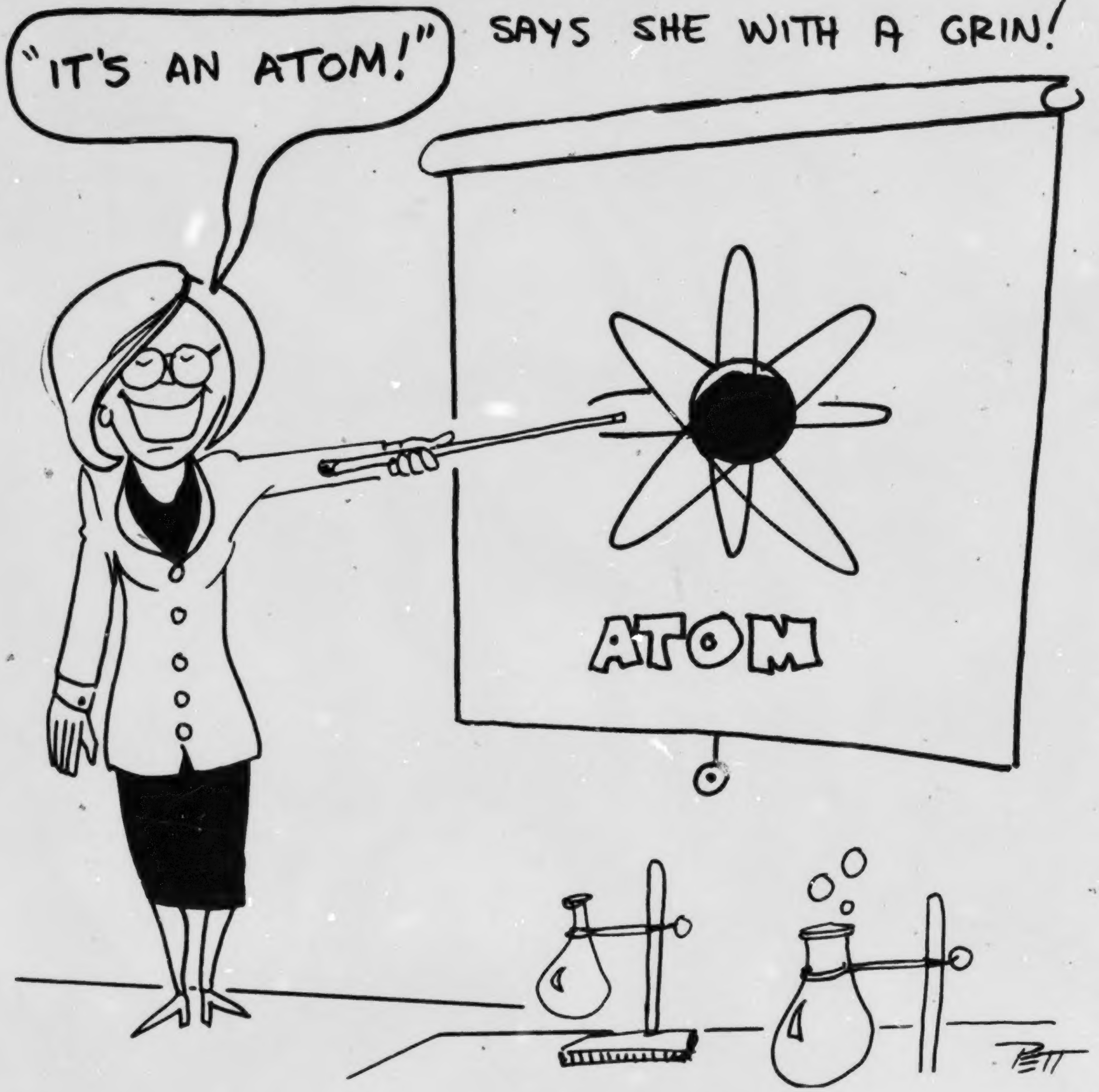
2. The second assessment activity is a list of scrambled words than when unscrambled spell different energy sources. At the bottom of the sheet have the students write down the circled letters in each energy source to spell out "awareness." Discuss with the students their new awareness of energy sources. The unscrambled words are: coal, wood, solar, person, water, nuclear, electric, gasoline, and gas. The symbols by each word are helpful clues and represent each energy source. This assessment activity could be given as a homework assignment or as an in-class group or individual assignment.

AN OTTER WHO LIVED BY A STREAM
LIKED TO SIT IN HIS HOLE AND JUST DREAM.
TO KEEP COOL AND STILL TAN
HE HAS RIGGED UP A FAN
A QUITE CLEVER CHAP, IT WOULD SEEM!



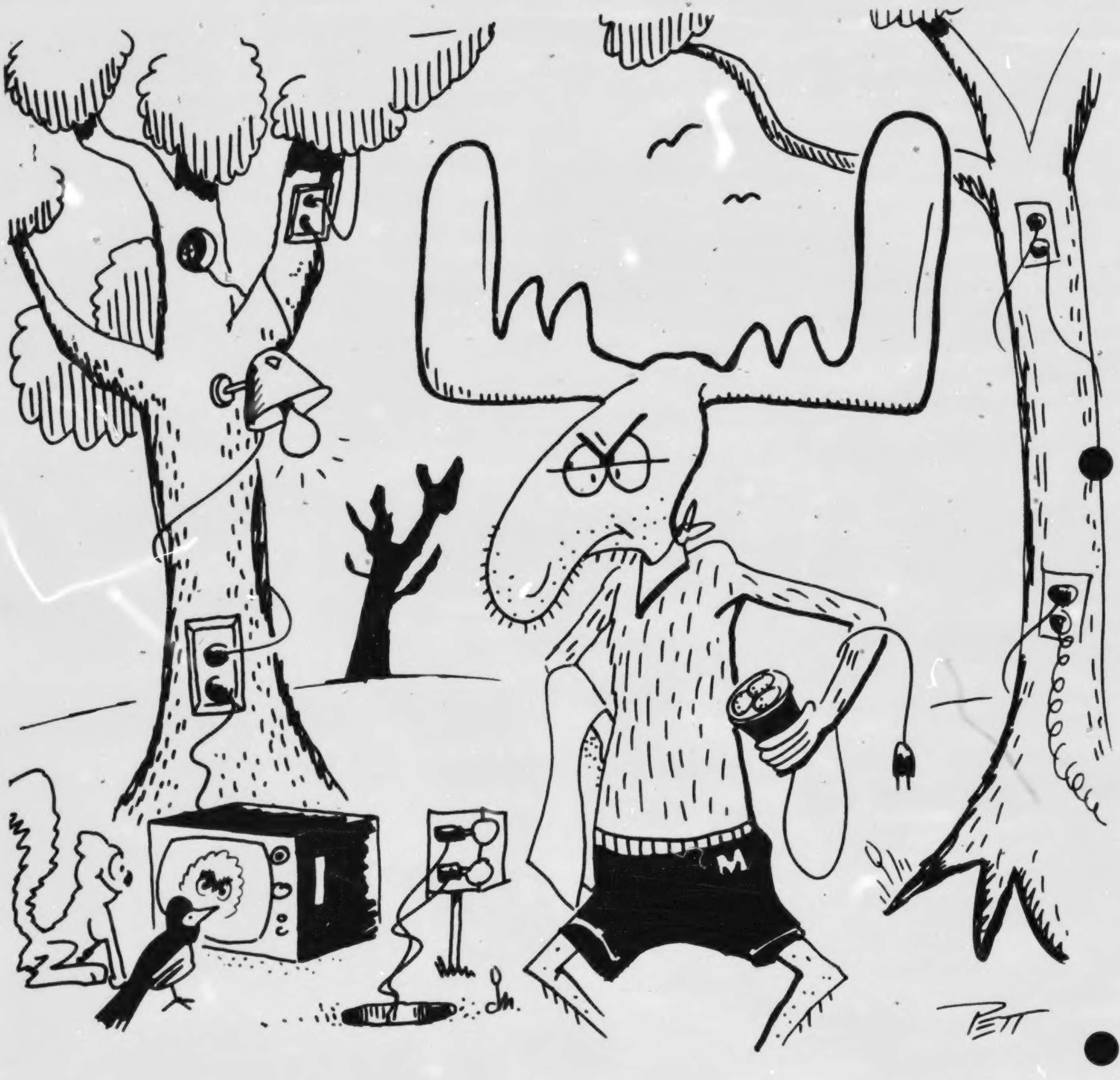
Q: WHAT KIND OF ENERGY DID THE OTTER USE TO POWER HIS FAN?

AS SMALL AS THERE EVER HAVE BEEN
(MILLIONS FIT ON THE HEAD OF A PIN!)
IS A THING THAT, WHEN SPLIT,
THROWS AN ENERGY FIT!
SAYS SHE WITH A GRIN!



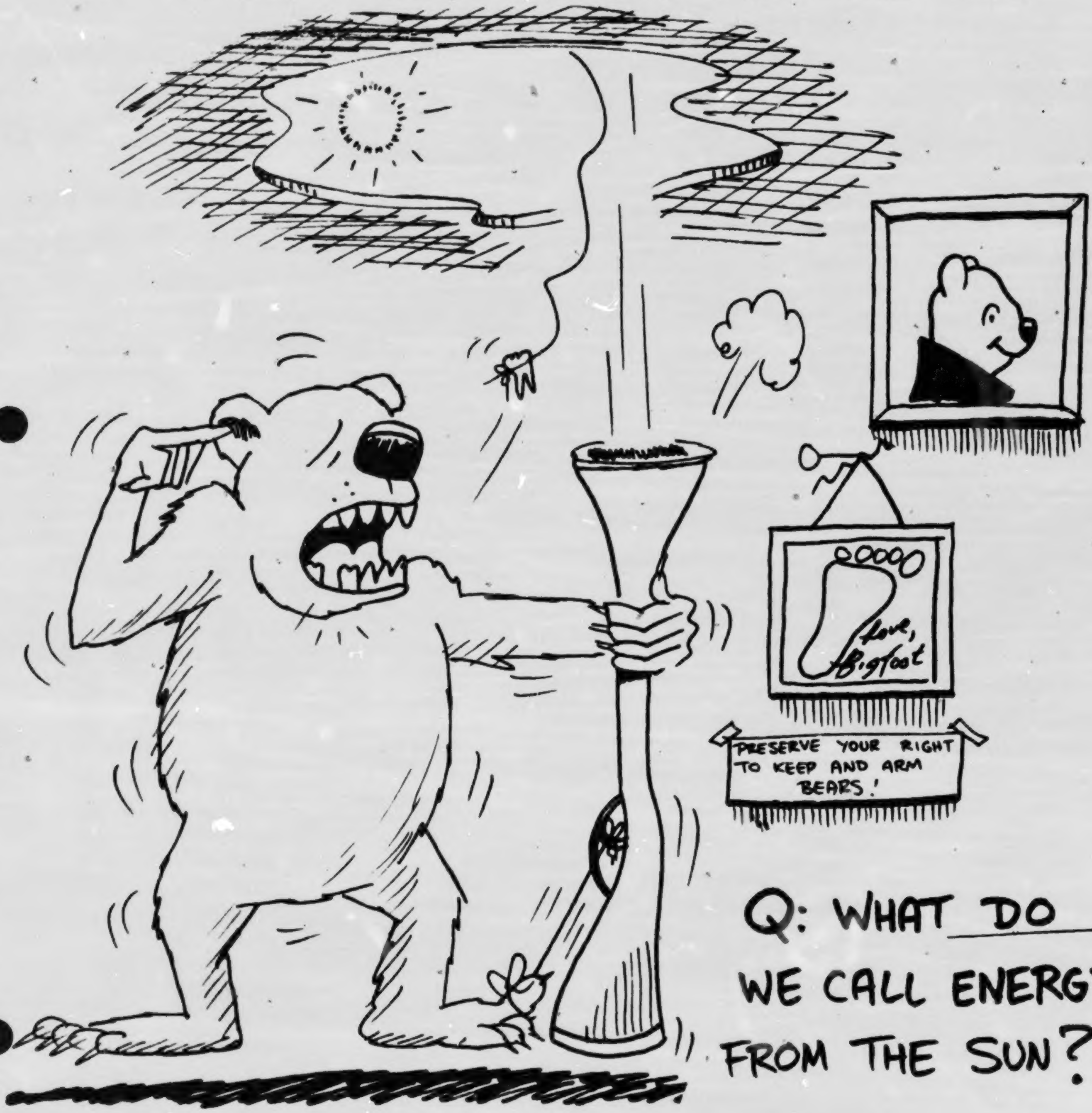
Q: WHAT KIND OF ENERGY DO WE GET
BY SPLITTING ATOMS?

A HANDSOME THOUGH STUBBLY MOOSE
WISHED TO PUT HIS NEW SHAVER TO USE
BUT IT WASN'T TO BE...
FOR THE PROBLEM, YOU SEE,
WAS EACH SOCKET WAS FULL! WHAT ABUSE!



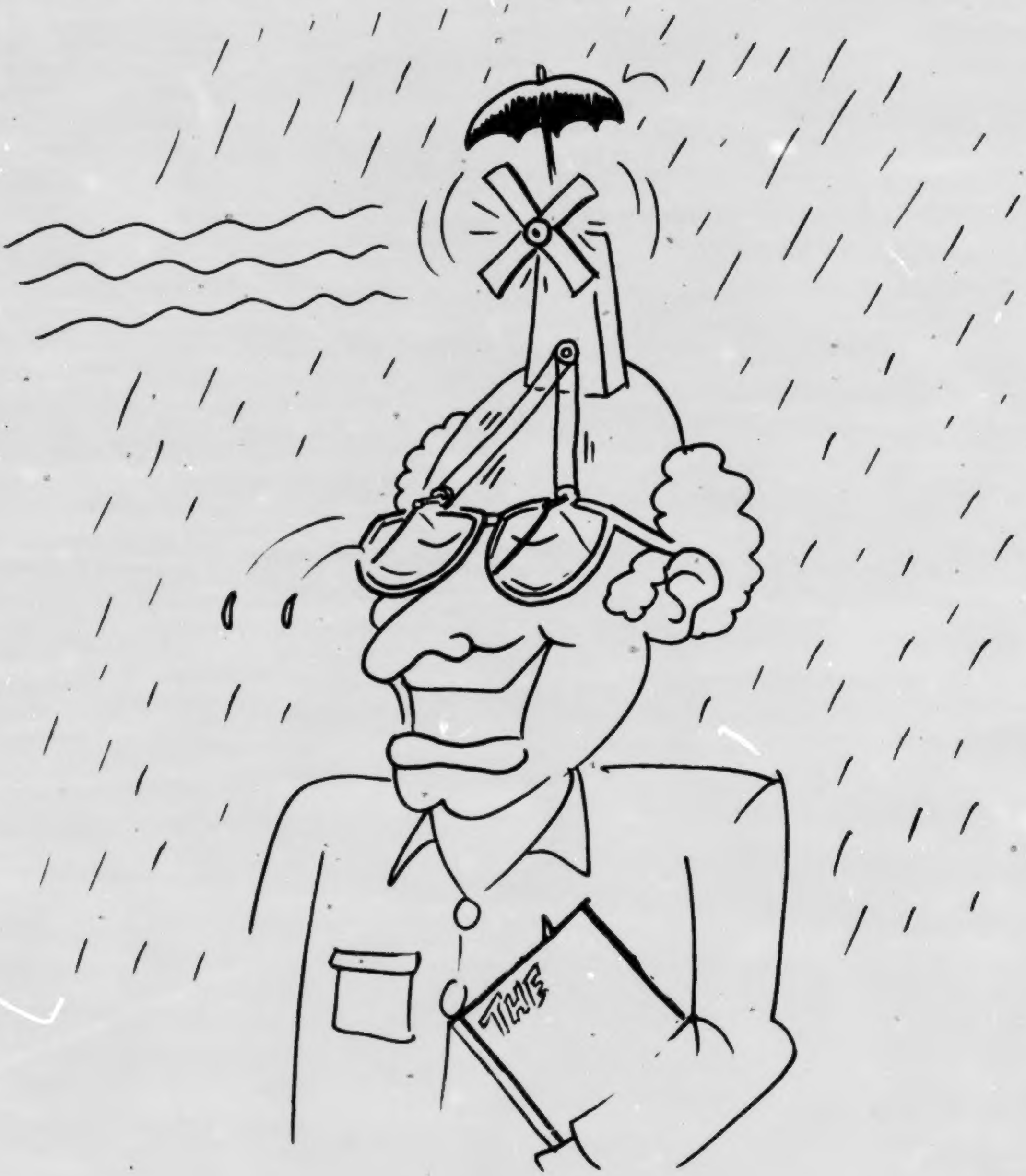
Q: WHAT KIND OF ENERGY ARE THE ANIMALS USING?

"A ROTTEN OLD TOOTH IS NO FUN!"
SAID THIS BEAR AS HE REACHED FOR HIS GUN.
OOPS! HE BLEW OFF THE ROOF,
AN INCREDIBLE GOOF!
BUT AT LEAST HE GETS HEAT FROM THE SUN!


Love,
Bigfoot
PRESERVE YOUR RIGHT TO KEEP AND ARM BEARS!

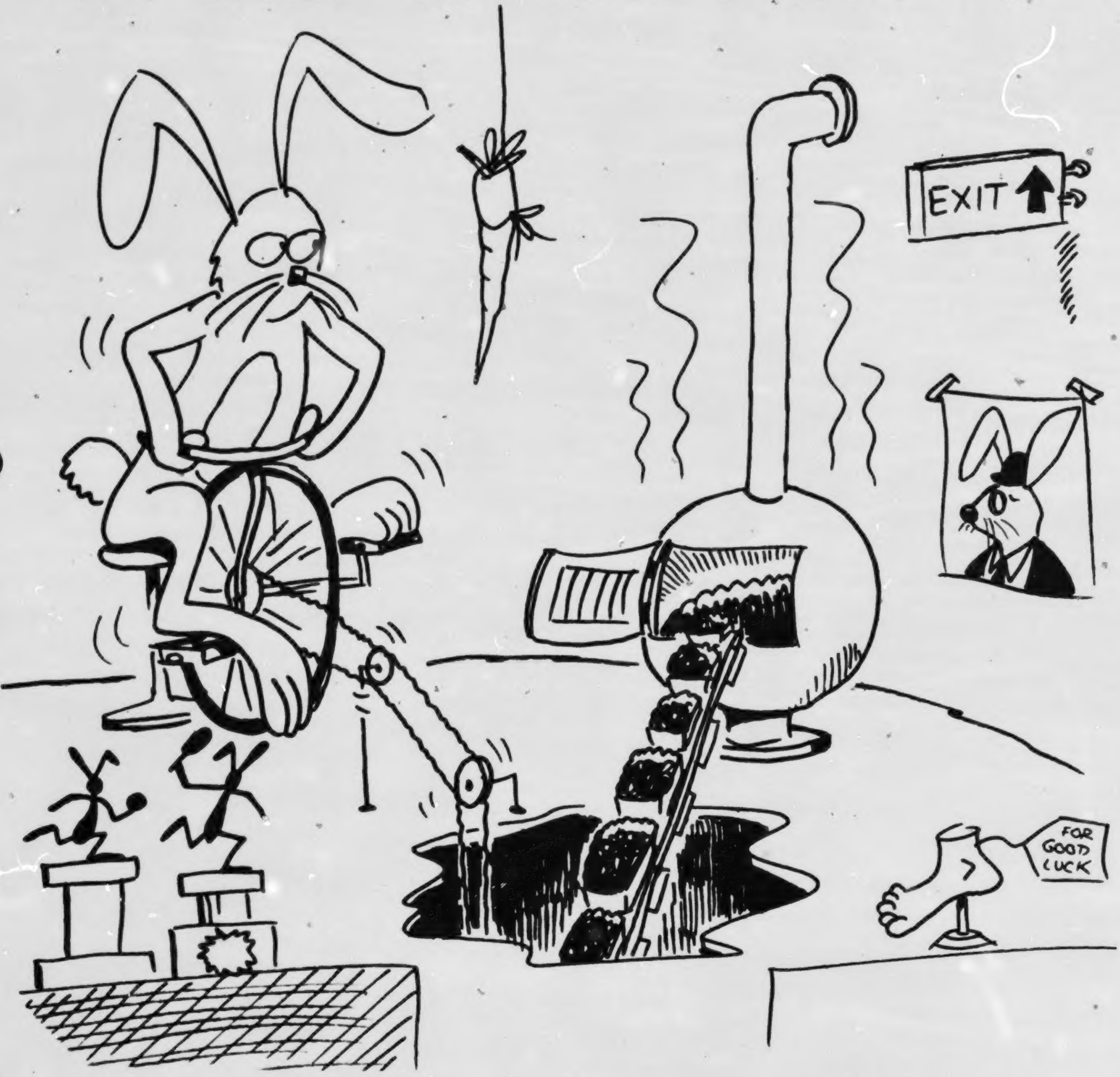
Q: WHAT DO WE CALL ENERGY FROM THE SUN?

AN IDEA FROM A BOOK WHICH HE READ
CAME TO THIS SMART INVENTOR NAMED FRED.
WHEN IT RAINS AND IT BLOWS,
HE CAN SEE, WHICH JUST SHOWS,
YOU CAN MAKE IT IF YOU USE YOUR HEAD!



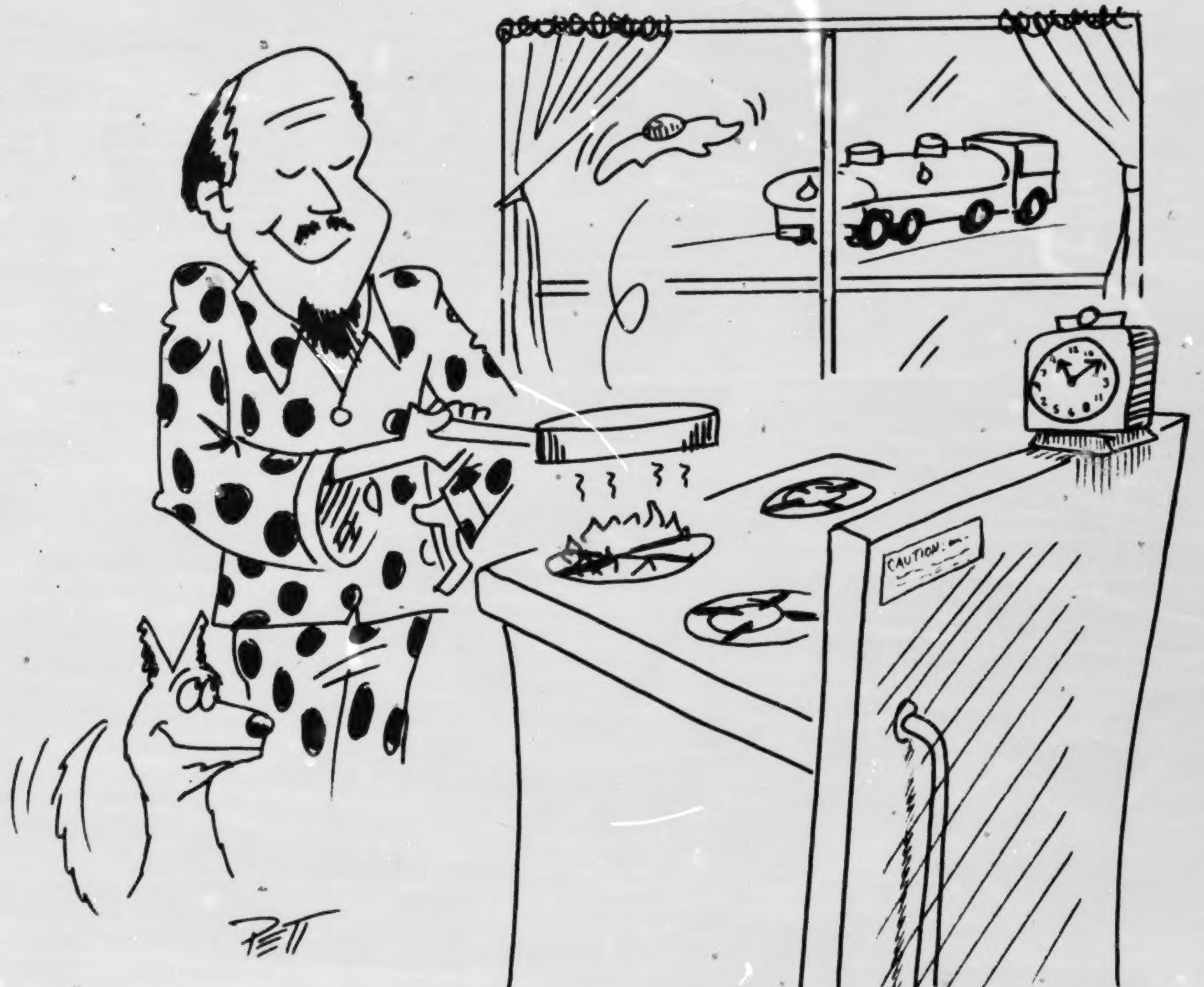
Q: WHAT TYPE OF ENERGY POWERS FRED'S MACHINE?

AS SHE PEDALS REAL HARD WITH HER FEET
THIS RABBIT PRODUCES HOME HEAT
IN THE WINTER SHE'S FINE
WITH HER VERY OWN MINE
IT'S A SYSTEM THAT CANNOT BE BEAT!



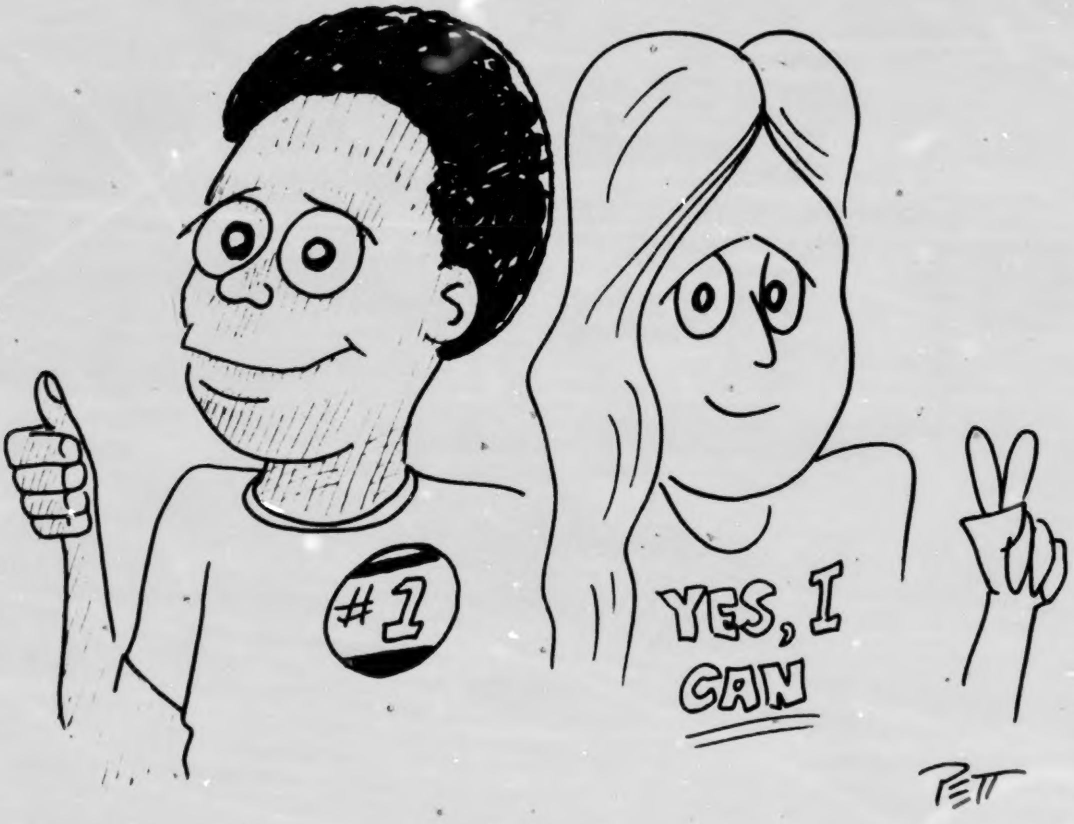
Q: WHAT KIND OF ENERGY IS THE RABBIT USING?

A LIQUID OR SOLID IT'S NOT.
WHEN YOU BURN IT, IT GETS PLENTY HOT!
AND IT CANNOT BE SEEN
DO YOU KNOW WHAT I MEAN?
IT'S A SOURCE THAT WE USE QUITE A LOT!



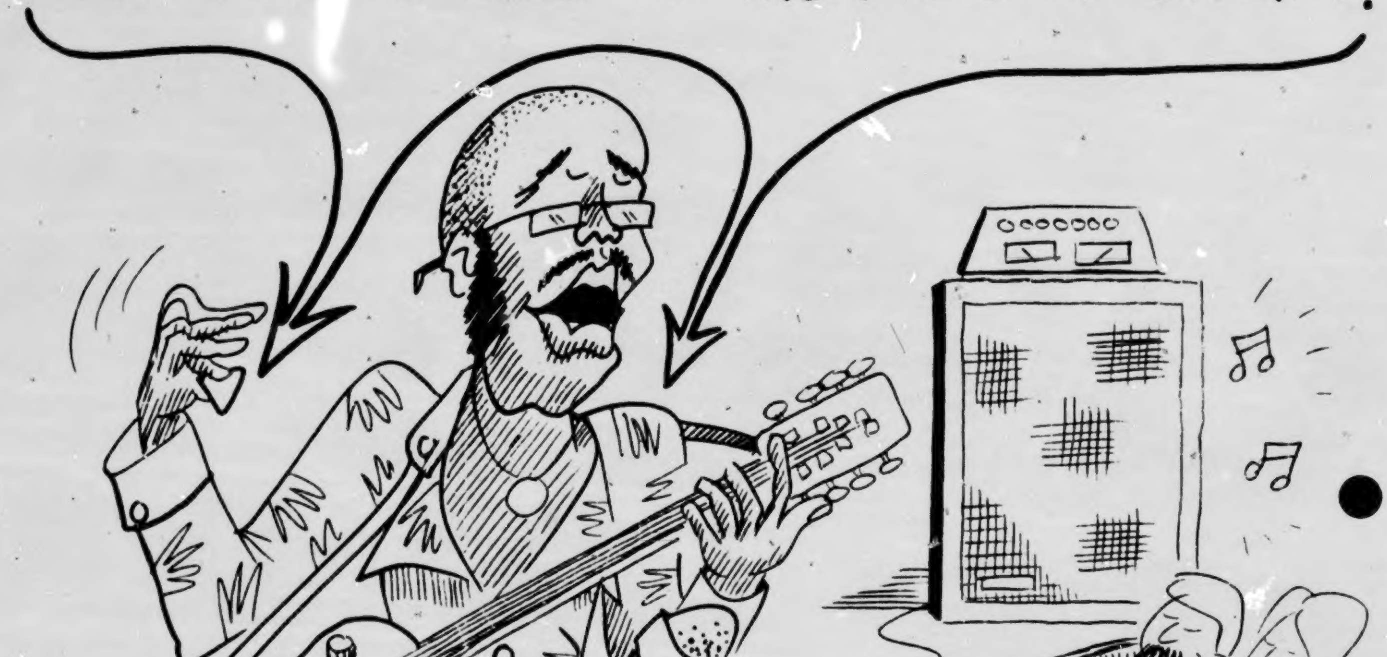
Q: WHAT ENERGY SOURCE IS THIS MAN USING?

OF ALL OF THE ENERGY SOURCES
THAT WE'RE LEARNING ABOUT IN THESE COURSES,
THE GREATEST OF ALL
IS YOU, SO DON'T STALL,
GET WITH IT AND HARNESS THESE FORCES!!



Q: WHAT KIND OF ENERGY DO WE ALL
HAVE A LOT OF??

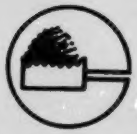
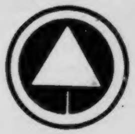
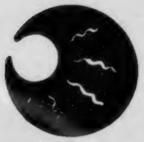
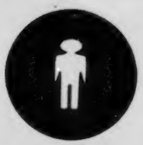
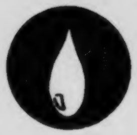
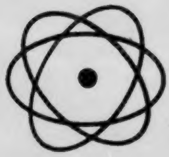
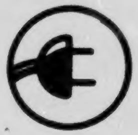
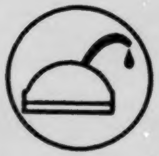
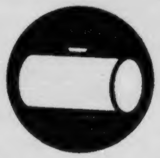
WE ALL BURN IT TO POWER OUR CARS,
AND TO SEND PEOPLE LOOKING FOR MARS.
AND IT COMES FROM THE GROUND,
YET IS EVERYWHERE FOUND,
FROM YOUR CLOTHES TO THE PICKS OF GUITARS!


REALLY HIGH-ENERGY MUSIC!!
A BARREL OF FUN!!

Q: WHAT KIND OF ENERGY ARE WE TALKING ABOUT??

CHAPTER 1 ASSESSMENT ACTIVITY 2-1

3-47

OLCA		☐☐○☐
WODO		○☐☐☐
RASLO		☐☐☐○☐
NOPERS		☐☐○☐☐☐
ETRAW		☐☐☐○☐
UNCLEAR		○☐☐☐☐☐☐
RECLECIT		☐☐○☐☐☐☐☐
ALONGISE		☐☐○☐☐☐☐☐
SAG		☐☐○

CHAPTER 2: SOLVING ENERGY PROBLEMS

Rationale

Chapter Two is designed to help students gain awareness of how people can help to solve energy problems. They will gain important knowledge and skills about the process of individual and group problem-solving. They will also undertake a major class project in energy conservation.

Basically, the chapter will provide students with ways to apply knowledge they learned in Chapter 1, and to learn participation skills. They will practice acting on their energy problems. All of these activities are key to developing effective energy actors.

Objectives

1. Students should recognize the dimensions of the energy problem as it applies to their everyday lives (Lesson One).
2. Students will become aware of themselves as important energy actors, and of a wide range of people who are involved in energy issues (Lesson Two).
3. Students will know the major energy actors involved in energy issues, and apply their knowledge to their own study of energy issues (Lesson Two).
4. Students will know basic energy issues and apply them to their own energy problems in their local community (Lesson Three).
5. Students will learn important skills in carrying out activities as individuals in solving their own energy problem (Lesson Four).
6. Students will recognize how groups can function to help solve energy problems (Lesson Five).
7. Students will develop skills in group decision-making, applying them to their local energy situation (Lesson Five).
8. Students will acquire basic valuing skills in making energy decisions (Lesson Six).

LESSON 2-1: ENERGY PROBLEMS

Rationale

The purpose of this lesson is to introduce students to a wide range of energy problems, including physical and human problems. These central concepts will be studied through this lesson and students will gain basic awareness of the range of energy problems they face now and in the future. Students will choose particular problems which they will work on for a class/group project.

Objective

Students should recognize the dimensions of the energy problem as it applies to their everyday lives. Teachers can assess the achievement of this objective through Activities C and G of this lesson.

Main Activity

A. Introduce students to one important energy problem-- the use of oil to make gasoline for use in cars. Use Picture 1-1 that is enclosed with this lesson. Talk about the origins of the gasoline that is used every day, the way it is transferred into gasoline pumps, and how cars use gasoline. You may want the students to do some research on oil and gasoline.

or

Ask students to read the newspaper and find articles regarding gasoline usage, or look through news magazines and find articles that they can bring to class.

or

Bring in an expert from a local gas station or chemical industry which uses oil, to talk about our oil consumption. The purpose here is to acquaint students with the use of oil as one important energy problem.

B. Ask students why gasoline might be a problem now and in the future for the United States. There are at least three reasons that should be discussed.

1. We may not have enough oil for our needs in the future.

2. We may need to use something else rather than oil to make gasoline to power cars.

3. The price of gasoline may rise so high that it will become virtually impossible for most people to use it as a fuel for cars.

These are the basic reasons why gasoline becomes a problem. The problem is basically one of demand, supply, and price. You should put these concepts on the board, and talk with students about their relationship. As demand goes up and as supply goes down, price goes up. Therefore, if we continue to have increasing demand for gasoline, and the supply dwindles, then the price will be so high that we will not be able to afford to use it.

C. Discuss with students how the problem of gasoline can affect them, now and in the future. Ask students to make a list of the oil products that they use, including gasoline for cars, oil-based products at home and any plastic implements they use in the classroom. You can refer to the enclosed picture or any other material that you have on hand in the class. The students should do a survey of their classroom and how oil energy and energy products are used. They should then discuss what would happen if they did not have enough of this energy and energy products or if these were so expensive they could not afford them. They should discuss what activities or kinds of behavior they would have to change in order to adjust to a lack of oil energy and energy products.

D. Have students review Picture 1-2 which is enclosed with this lesson. Ask them what would happen if the price was so high that the oil energy and energy products could not be used by individuals. Students should be able to see that oil energy and energy products in the home, at work, in the community, and in the school are a vital part of the everyday lives of most Americans. They should also see the need to conserve the use of this energy and energy products.

E. Now use the series of pictures (1-3 through 1-6) to have students explore energy problems that are basically problems of sources. They should be able to pick out problems of oil, coal and natural gas, as well as solar and water energy, and how shortages would affect their everyday lives as well as how the cost of these important sources could affect them.

F. Use the next series of pictures (1-7 through 1-8) to see problems of individuals in groups toward the energy problem. The energy problem is as much a problem of human action as it is one of resources. Individuals can take actions which waste energy. Groups can decide to take action on an energy policy. All of these actions influence the energy problem. In effect, human actions are a problem in and of themselves. As long as we do not act, we will accentuate the energy problem that we face.

G. Help students to determine a project that they might undertake as a class or as groups in the class. Have them pick a particular energy problem which is important to them and on which they might work throughout this chapter. List the topics and identify the groups or work with the whole class. In order to fully understand the topic, students should begin gathering information about the problem that they have chosen.

Grade Level Adaptation

K-1: Choose one energy product and talk with students about the problems of non-human and human energy that are attached to this particular product.
2-3: Collect pictures of a variety of projects and then go through each one with the students talking about problems of energy use and consumption.

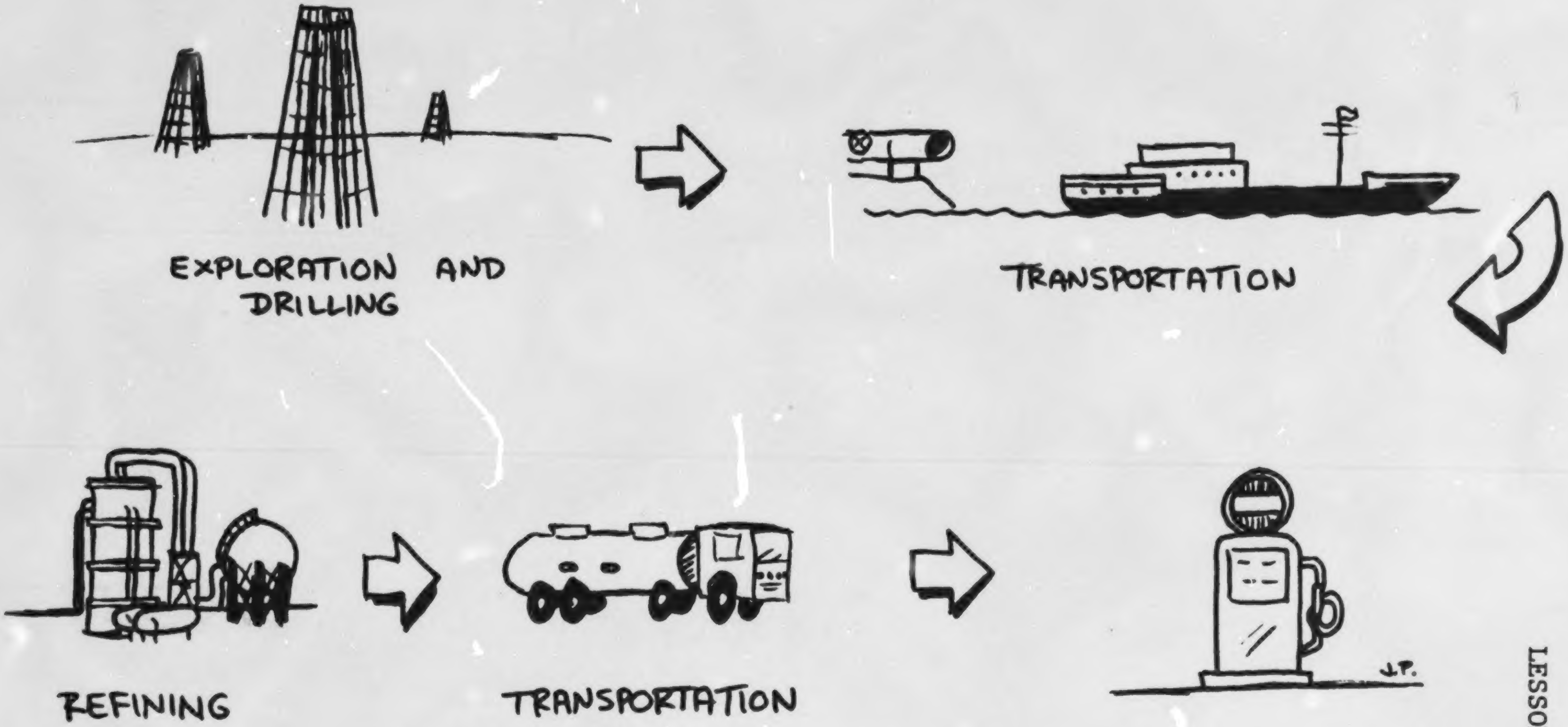
Language Arts Adaptation

K-1: Ask students to draw pictures of energy problems and talk with you orally about what the pictures mean and what the problems are.
2-3: Create a spelling bee out of oil energy and energy products and either have students spell the words relating to energy and energy products that are made with oil and/or put them in sentences.
4-6: Ask students to write an essay about how oil affects them and their homes or community.

Math Adaptation

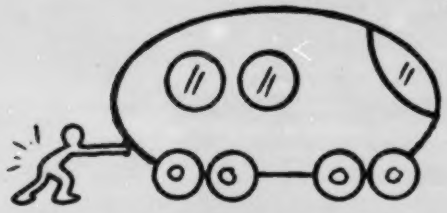
K-1: Ask students to draw a picture of the misuses of energy sources. Have them show the pictures in class and ask students to count the misuses that they can find.
2-3: Ask students to count the number of oil products that they use in their classroom. You may want them to categorize these products and then add or subtract kinds of products.
4-6: Ask students to graph the amounts of oil products used in their classroom. They might want to create demand and supply percentages and then talk about links to price and what they could afford and what they could not afford in their own everyday lives or in their classroom.

HOW PETROLEUM BECOMES GASOLINE

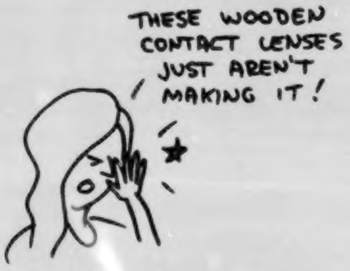

EXPLORATION AND DRILLING
TRANSPORTATION
REFINING
TRANSPORTATION
J.P.

LESSON 2-1: PICTURE 1-1

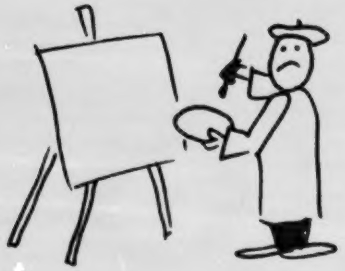
IF THERE WERE NO MORE OIL, WOULD THERE BE....



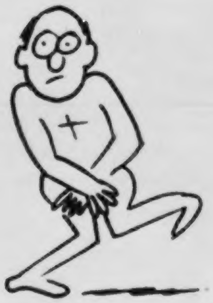
...GASOLINE?


THESE WOODEN CONTACT LENSES JUST AREN'T MAKING IT!

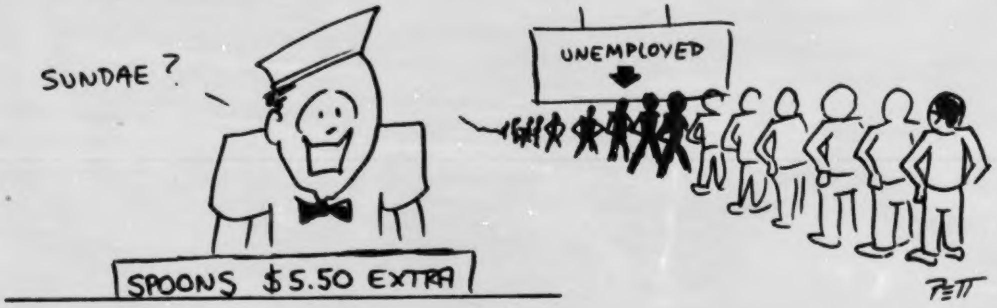
...PLASTICS?



...PAINT?



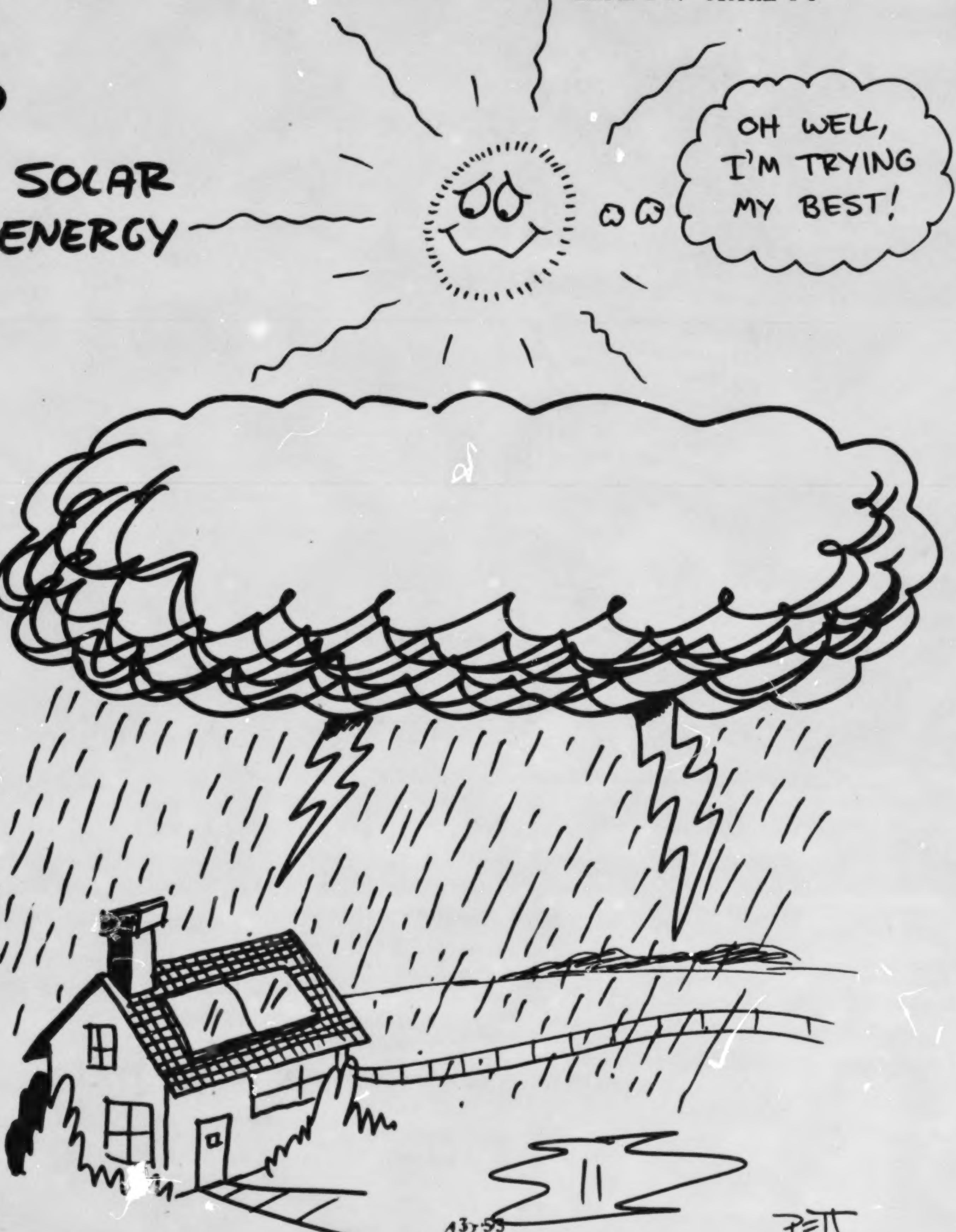
...PETROLEUM-BASED FIBERS?


SUNDAE?
SPOONS $5.50 EXTRA
UNEMPLOYED
PETT

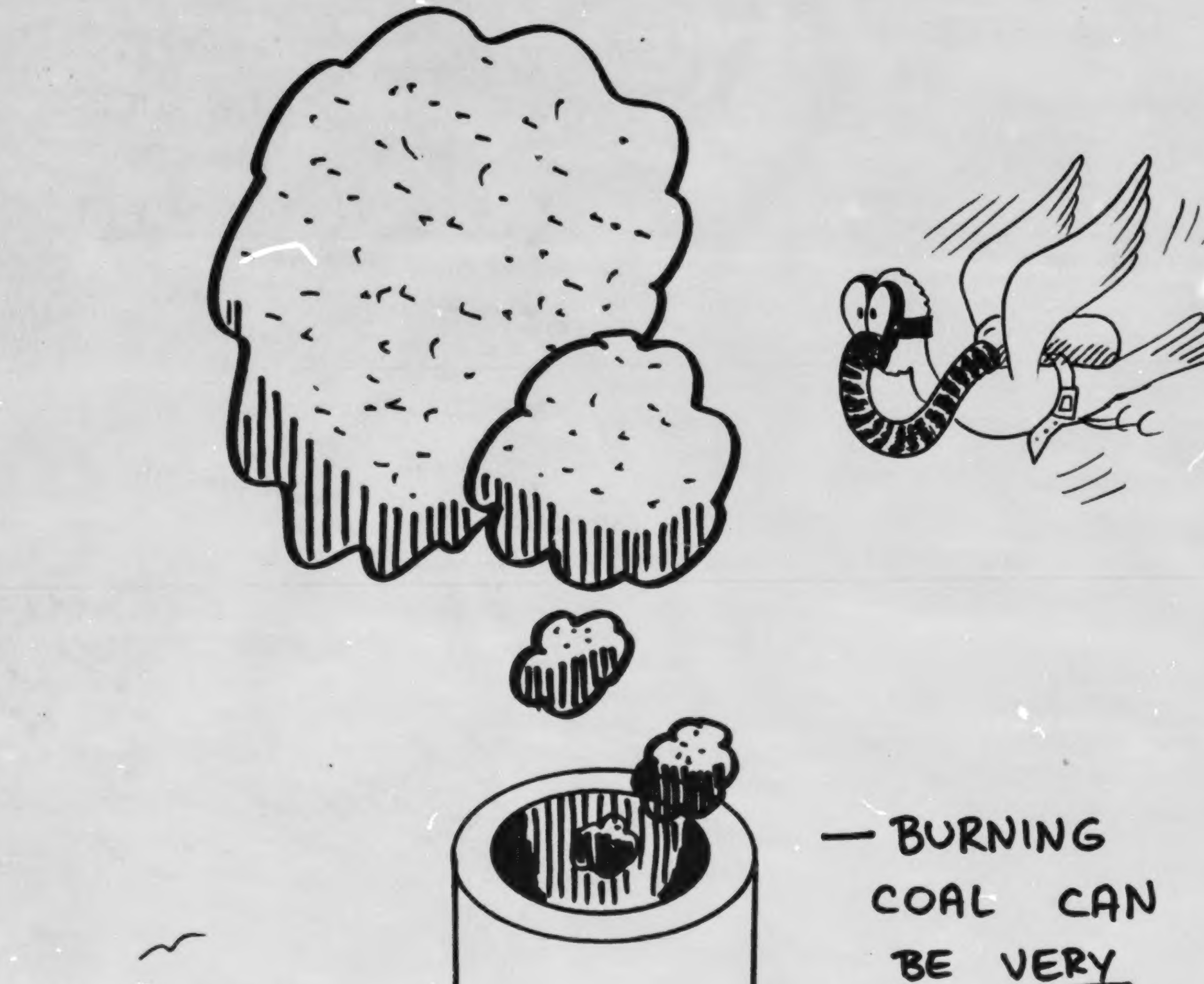
....ECONOMIC STABILITY?

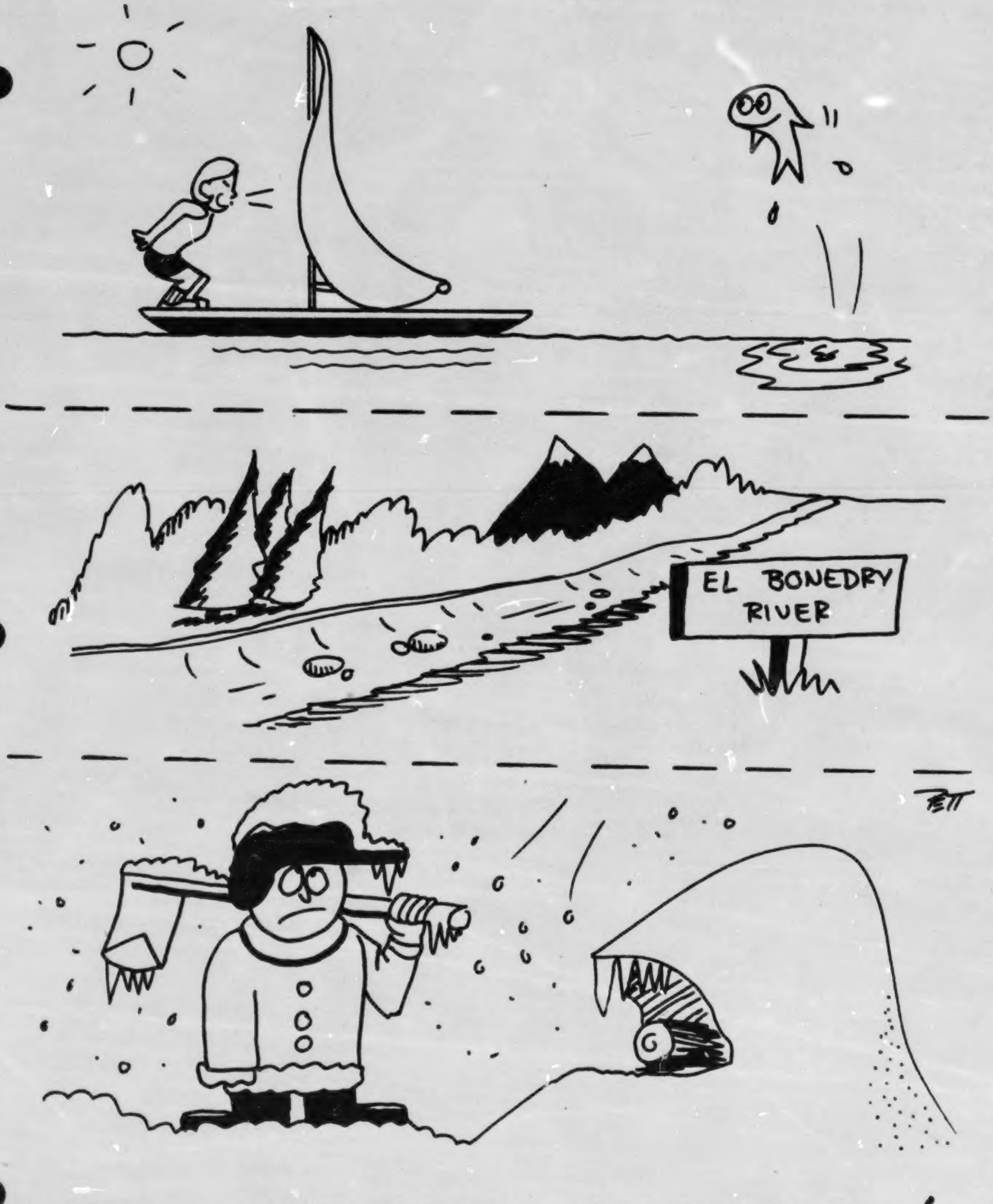
3-54

LESSON 2-1: PICTURE 1-2


SOLAR ENERGY
OH WELL, I'M TRYING MY BEST!
PETT

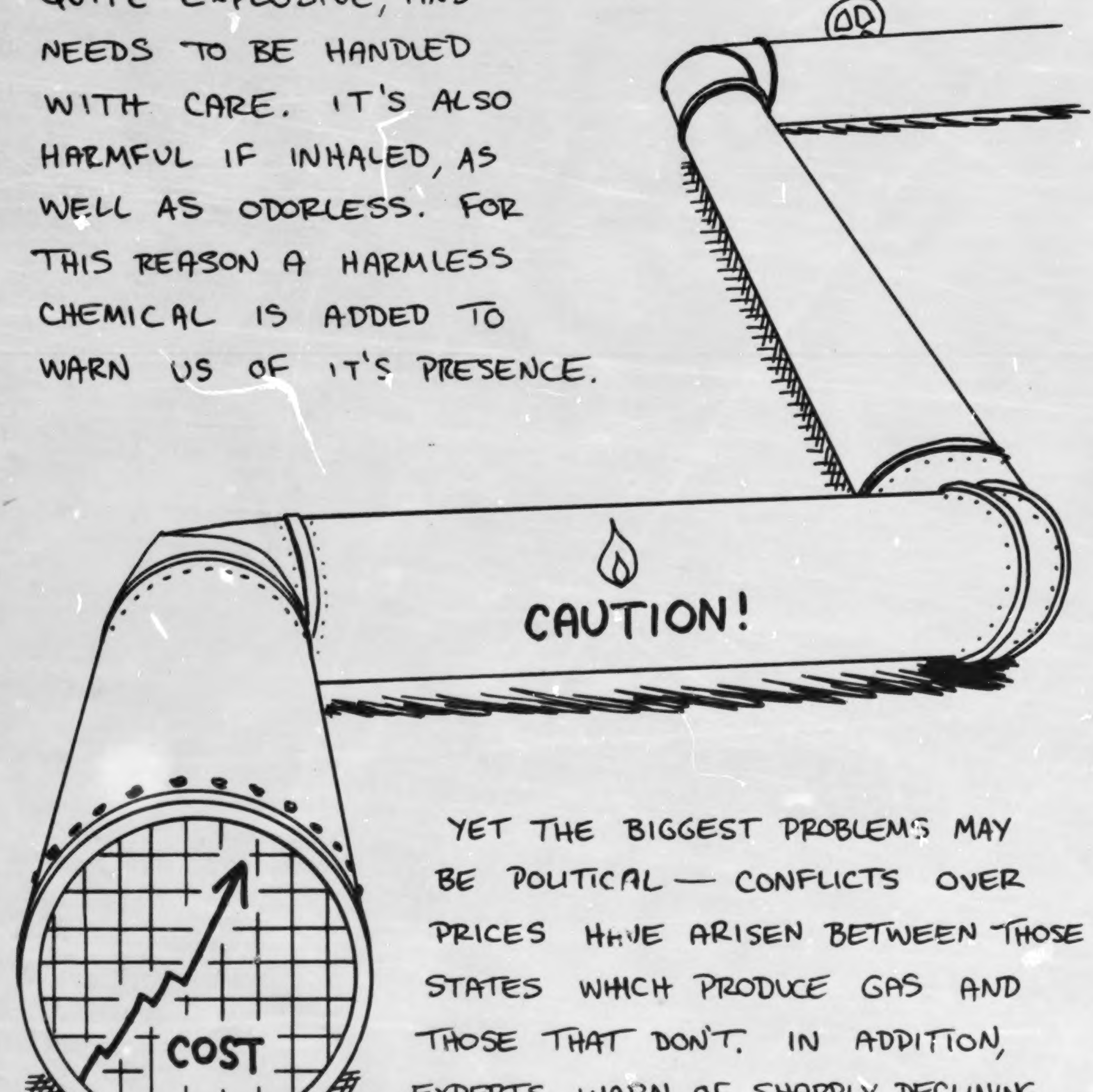
LESSON 2-1: PICTURE 1-4


— BURNING COAL CAN BE VERY DIRTY!!
COAL INC.


EL BONEDRY
RIVER
PETT

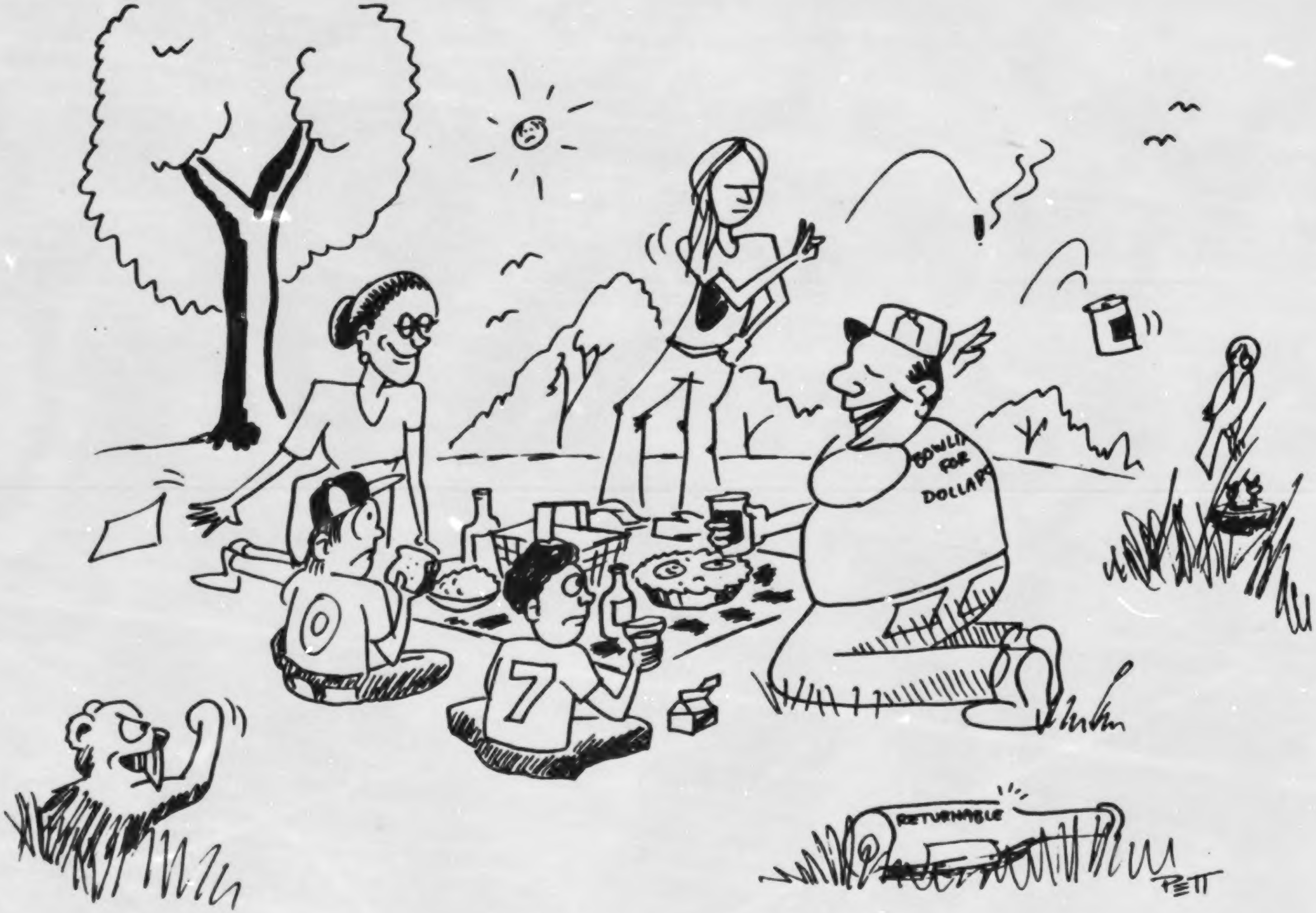
THERE CAN BE PROBLEMS WITH ANY SOURCE!

HARNESSING **NATURAL GAS** POSES A UNIQUE SET OF PROBLEMS. IT IS QUITE EXPLOSIVE, AND NEEDS TO BE HANDLED WITH CARE. IT'S ALSO HARMFUL IF INHALED, AS WELL AS ODORLESS. FOR THIS REASON A HARMLESS CHEMICAL IS ADDED TO WARN US OF IT'S PRESENCE.



YET THE BIGGEST PROBLEMS MAY BE POLITICAL — CONFLICTS OVER PRICES HAVE ARISEN BETWEEN THOSE STATES WHICH PRODUCE GAS AND THOSE THAT DON'T. IN ADDITION, EXPERTS WARN OF SHARPLY DECLINING LONG-TERM SUPPLIES, AND THE POLITICAL AND ECONOMIC TROUBLES THIS COULD BRING.

3-59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BOWLING FOR DOLLARS
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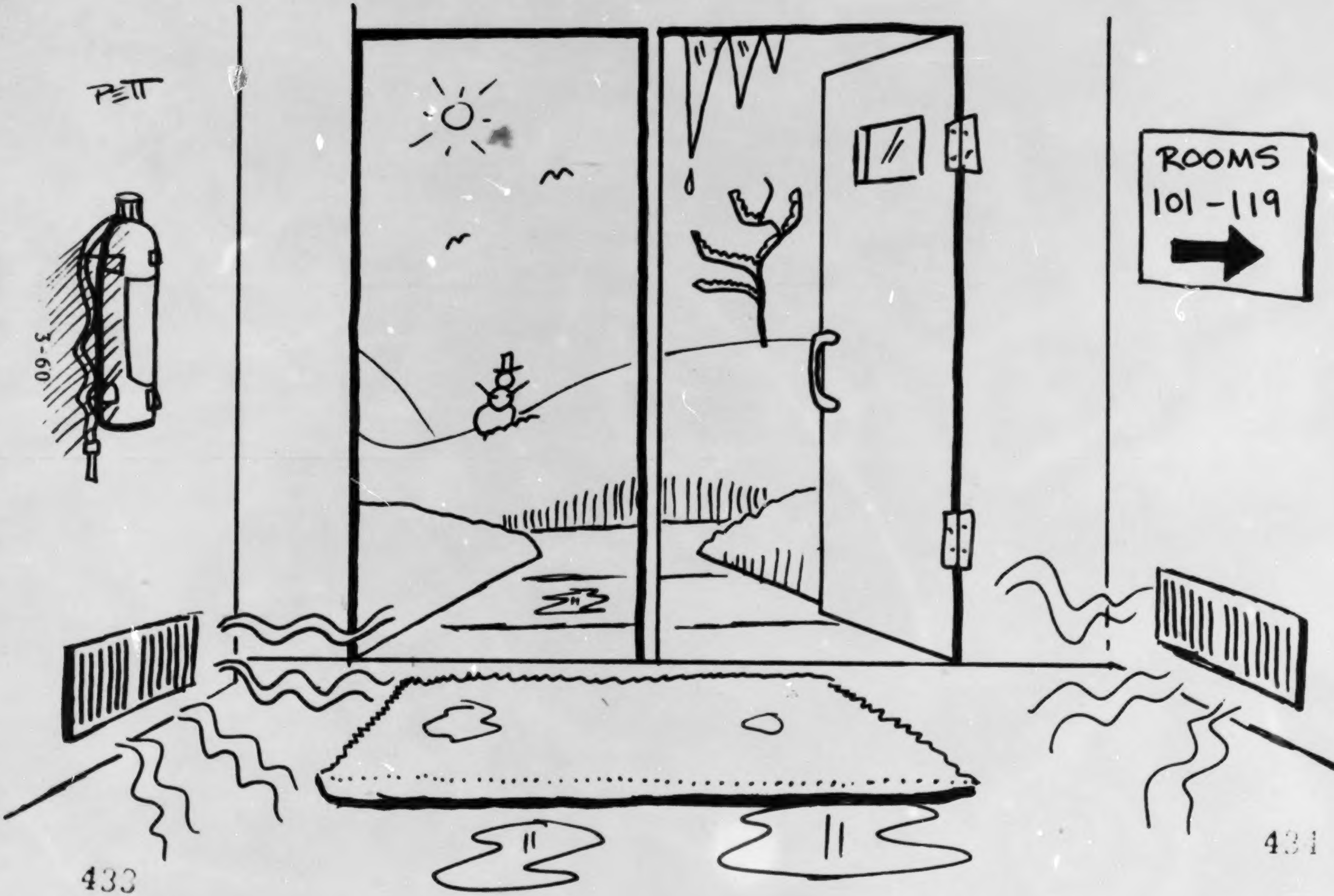
LESSON 2-1: PICTURE 1-7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LESSON 2-1: PICTURE 1-8

LESSON 2-2: ENERGY ACTORS

Rationale

Students have identified some major energy problems in previous lessons. Here, they will learn about the wide range of actors that become involved in problem-solving on energy issues. They will learn about these actors and apply their knowledge to their own roles as effective energy actors and their own energy projects. They will identify the major energy actors involved in the question they are studying, as well as how they can act in productive ways in relation to these actors.

Objectives

1. Students will become aware of themselves as important energy actors, and of a wide range of people who are involved in energy issues. Assessment of this activity can be determined by students' responses to Activity F in this lesson.

2. Students will know the major energy actors involved in energy issues, and will apply their knowledge to their own study of energy issues. Assessment of this knowledge can be made by students' responses to Activity C in this lesson and to Assessment Activity 2-2 at the end of this chapter.

Main Activity

A. Talk with students about how energy actors are not unlike actors in a play that they have read, a story that they have just read, or a TV program that they have watched. Actors are people who take a part, who try to take actions in a situation. Review with students the major actors in a play, story, or program that you select, and how they take part and work with other actors. For example, if students have been watching a particular television program, have them identify the lead actor and/or actress. Have them show how these people interact with others in the story in ways such as making a decision about what to do, or taking a particular action.

B. Talk with students about how actors can also be energy actors. In effect, the energy problem presents the setting for the play and people take part by playing various roles and acting together. Use Dialogue 2-1: "Rhoda's Choice" to have students see the actors, the parts they play, and other actions that might be involved in Rhoda's choice. Ask them to read "Rhoda's Choice" to themselves or aloud or have them role play the dialogue completing the conversation between Rhoda and Annie using their own idea about saving energy. Help them answer the following questions.

1. Who are the actors in this case? (Rhoda and Annie)
2. What part did the actors play in their discussion about energy? (Rhoda asked to turn out the lights; Annie asked her questions.)
3. What other actors might be important to include in this dialogue? (i.e. Rhoda's parents might have come in.)

C. There are a wide variety of major actors involved in any energy situation. The three stories which are enclosed with this lesson indicate how some of the major actors are involved in the energy problem. Majors actors include government, business, citizens, utilities, producers of energy, and people who transport energy. Have students read the three cases silently, aloud, in small groups, or as a class, and then conduct a class discussion using the following questions.

1. Who were the major actors in these cases? (i.e. Pete)
2. What part did they play in the energy problem that is posed? (i.e. They tried to save energy, they wrote their Congressperson.)
3. How might citizens influence actors on an energy question? (i.e. talk with them, write them)
4. Which group would be likely to have the greatest effect on energy savings in the community?

D. Bring in someone to the class who is an actor on an energy question from government, business, a utility company, a producer, or a person involved in transportation. You might also want to bring in a person who is a citizen who is now active in the energy area. Have that person discuss with students the way they act on energy issues, why they act as they do, and how they make decisions.

or

Have students study one energy actor and write a description of that actor and how the person plays a part in an energy issue.

E. Talk with students about how they also are actors in the energy area. They are first actors as citizens. They ride in cars and consume energy by lighting and heating their homes. They are also potential future actors in businesses, government, utility companies, transportation, industries, and other areas. Therefore, the things they learn about actors now will help them to see what kinds of energy decisions they will need to make when they enter these types of occupations. Talk with students about how they are actors now, what kinds of energy actors they might be in the future, and how they would act differently in a job in government or business, for example, as a result of learning about the energy problem. Work with students in designing a play about energy actors. Have them present the play to a lower grade class. Ask them to design questions which they can use to guide a discussion with these students after the play.

F. Then have students identify the actors that are involved in the class or group project which they are undertaking. They should identify actors in government, business, utilities, producers, of energy, or energy transportation which impact on their energy problem. They should also talk about how they are energy actors, and how they have an impact upon the problem they are seeking to study. This identification of actors will help them in their own study of the energy problem. Make a list of the actors they identify on the board, and make a list of ways they identify for taking their own action in regard to their energy problem. Then help students summarize the importance of actors in any energy issue.

Grade Level Adaptation

K-1: You may want to read the dialogue to the students. Have a person who is an energy actor, or several people, come to your classroom to talk about how they act in the energy area.
2-3: Have students collect pictures of the major kinds of energy actors. You may also want someone to come in and visit the class who is from one of these occupations.

Language Arts Adaptation

K-1: Have students work with puppets to talk about how different energy actors use and save energy using the stories as a basis.
2-3: Have students as a class compose stories from the four cases. Have them write a short description of one energy actor.
4-6: Have students write a song focusing on one energy actor and how he or she contributes to energy issues.

Math Adaptation

K-1: Have students collect pictures of energy users and sort them according to the amount of energy used by each picture.

2-3: Have students collect data using a simple math idea that you are teaching on the use of energy by any of the actors outlined in this lesson.

4-6: Have students collect data on average wattage of outdoor signs. If each store has three outdoor signs and there were 100 stores in Mary's city (see story 2-2) how much power was saved?

DIALOGUE 2-1: RHODA'S CHOICE

The scene for the play is Rhoda's house. Rhoda and her friend, Annie, are in Rhoda's room. They are deciding whether or not to play a game.

Rhoda: Let's play a game.

Annie: Okay. I want to stay inside. It is raining.

Rhoda: Okay. Let's play checkers.

Annie: I'll turn on the lights. That way we can see better.

Rhoda: Well, I....

Annie: What is wrong?

Rhoda: I don't use my lights very much.

Annie: But we need them to see.

LESSON 2-2: STORY 2-2

THERE NEEDS TO BE A LAW

It was winter in Indiana, and it was cold. It was cold outside, and inside. People in Indiana did not have coal. They used coal to make electricity for lights and heat.

People who mine coal in Indiana and other states had stopped. They wanted to get more pay for their work. They also wanted to be able to stop working if there were dangers. Mining is very dangerous work. The miners would not accept a new contract until their safety was guaranteed.

The electric company had asked people to cut back on their use of heat and lights during the work stoppage. Mary's parents did and so did some of their neighbors. They turned down their heat to 60° and everyone wore sweaters. They used fewer lights, and watched TV less often. The schools also turned down their heat and turned off many lights.

As Mary's parents were driving through town, they saw the lights on in some businesses. They were angry. They thought that people should turn their lights off. They needed the electricity for heat in their home.

Mary's dad called the city government. The chairman of the city council was an old friend. The chairman was sympathetic to his position. The neighbors signed a petition and presented it to the council at their next meeting. Many other important community members spoke in favor of the law to turn out lights in town.

The city government then passed a law that only one sign could be lighted in a business.

Mary's dad was happy and so was Mary. It was better this way. It would be much better when the coal miners went back to work, but the energy problem would not go away. Mary and her family hoped some of the lights would never be turned on again so that energy could be saved.

LESSON 2-2: STORY 2-3

THE SCHOOL BUS

Pete and Jimmy rode the school bus every morning. They enjoyed it. It was a short ride, and a nice way to go to school.

Sam did not ride the school bus. His parents drove him to school. The school did not have enough buses, and students in Sam's area could not use the bus service.

Pete knew that cars used a lot of gasoline. He was concerned about energy. He talked with his father. His father said that the school board was in charge of deciding to buy buses and determining where they went. They could make it possible for Sam to take the school bus.

Pete's father talked to Sam's father. Sam's father owned one of the grocery stores in town. His friend who owned the store with him was on the school board. They talked with Sam's father's friend. The school board brought the issue up. They had some money they could use to buy more buses. Sam's father, many students in Sam's school, and the president of the P.T.A. were all in favor of new buses.

The president of the P.T.A. made an eloquent speech in support of new buses. Sam presented a poll taken by the students which showed that they wanted the buses. The city Good Government League offered to help by paying half of the cost of the new buses with money they raised from citizens. The board voted in favor of the buses, and changed the bus route so that Sam and other students could take the bus.

Pete was pleased. Now they could ride to school with Sam, and save energy at the same time.

LESSON 2-2: STORY 2-4

BIG GOVERNMENT

President Carter wanted to save energy. He thought that cars used too much energy. He also thought that people used too much energy in heating their homes. He presented his ideas to Congress, which then had to make decisions.

Congress would decide. Many people in Congress were in favor of saving energy. Yet they disagreed about how to do it. Some wanted to tax people who used a lot of energy by making them pay more for big cars or gasoline. Others did not. Some wanted to regulate the producers of energy so that some forms of energy, such as coal, would be much cheaper than others, such as oil. Others disagreed.

Congress had a hard time deciding. Susie's parents wrote to their representative in Congress. They wanted to help make a decision to save energy. Other people in Susie's town wrote also. Susie's class wrote their ideas to their representative. Their representative listened to all their ideas, and became much more involved in the debate over taxing and regulating energy.

It would take a long time for Congress to make a decision, but Susie and her parents and neighbors had helped. Meanwhile, people like Susie would have to do their best to save energy in whatever way they could.

LESSON 2-3: WHAT ARE THE ISSUES?

Rationale

Students have learned about energy problems and actors. Energy is in itself a major issue. People disagree about what to do about the energy problem and even whether there is one to be tackled. Basic issues involved in the question include: Who will decide? How will we carry out solutions to energy problems? How will we determine the results of our efforts? These types of basic issues are those that raise questions and even controversy in local, state, national, and international arenas.

Here students will learn about what an issue is and how the three questions of who will decide, how it will be done, and how the results that will be determined can apply to their own energy problem that they have selected for study.

Objective

Students will know basic energy issues and apply them to their own energy problems in their local community. Teachers can assess the achievement of this objective by students' responses to Activity F of this lesson or Assessment Activity One at the end of this chapter.

Main Activity

A. Discuss with students an issue which is important to them -- whatever issue you think students will find important in their classroom or school and on which they might be divided on. It might be what to do tomorrow or some activity the student council is planning. The point here is for students to see that issues are things about which people have differences of opinion or disagree. They should understand that there are many issues in their everyday lives including in their classroom or in their school. These issues are not resolved easily. Even deciding what to do tomorrow in class may be a difficult decision for the class to make because students will disagree over what they want to do.

B. Now discuss with students how energy is an important issue that is like the issues that they have discussed in their class or school. Talk with students about an issue such as turning off the lights. Have the class try to make a decision about whether and how the lights will be turned off in their classroom if they wanted to save energy. Raise with students the basic issues of who will decide.

Will the class decide as a whole? Will the class appoint someone to decide? What decision-making rule will be used? Then raise the issue with students about how they will carry out their activity. They might save electricity by turning out lights altogether, by turning them out some hours and not others, or by turning them out on certain days of the week. There probably will be basic disagreement about how to carry out this activity. This is another important dimension of the issue of saving on electric energy. Then introduce them to the issue of how they will determine how much energy they will save. This is also a very difficult issue, for most students will not have measures for how much electrical energy they will save.

Review with students the basic questions of who will decide how the decision will be carried out, and how they will determine the results of their decision. Indicate to students that these are three basic issues that are true of any energy problem that they try to solve. If the problem is lighting or heat, water or wood conservation, they will run into these three particular issue dimensions of the problem.

C. Now work with students to make a list of issues that they think are important in the energy problem. They might list issues of energy choices, energy use, or energy consumption. When the list is made, ask students to break into groups and try to bring about a resolution of one of the issues they have listed. The group should then make presentations to the class and try to get the class to agree. In this way, students will see that there are many issues involved in the energy question and that they are difficult to resolve because people do have true differences of opinion about how to resolve them.

D. Now have the class or the class groups who are working on their own energy problem discuss the basic issues that are involved in this problem. Have them meet as groups or as a class and talk about the issues of who will decide, how the decision will be carried out, and how they can determine the results of their decision. Give students as much time as they need in order to fully understand the basic issues that are involved in the problem that they have chosen.

E. Once students have clarified the issues for themselves have them interview one of the major actors involved in the problem that they have chosen. Have them design questions which seek information about the major issues involved in deciding, implementing and determining the results of their energy problem. Have students report back to class the additional issues that they discover by interviewing this individual or individuals.

F. Now have the class groups schedule debates over the major issues involved in their energy problem. Students from the group should take a side in the issue and present argument that people are giving for that particular side. The class should them discuss each of the following questions after the debate has been completed:

1. What issues are involved in these energy problems?

2. Who will decide how yhese energy problems will be resolved?

3. How will the decision be implemented for these problems?

4. How can the result of making the decision be determined?

Grade Level Adaptation

K-1: Choose one issue around which students can talk. Have them discuss an issue in their classroom or in their homes. They should see that people have different opinions about what should be done on the issue. Then take one energy product and have students discuss the issues that are involved in conserving this energy product.

2-3: Bring a series of magazine pictured and articles to class. Have students determine which issues are involved in the energy questions that are featured in the picture. Then have students talk about what issues they see in trying to conserve some of the energy shown in the pictures.

Language Arts Adaptation

K-1: Ask students to use a tape recorder in order to present their particular point of view about an energy problem.

2-3: Ask students to develop posters with slogans which reflect their point of view about energy conservation.

4-6: Ask students to develop a dialogue where two or more people debate the sides of a particular energy issue.

Math Adaptation

K-1: Talk with students about two or three energy issues. Take a poll of the class and have students count the number of people who are in favor of or against certain solutions to these issues.

2-3: Have students poll the class about several energy issues. Have them add the responses to their poll and then try to convince students to change their position. Students can then subtract the number of responses which have changed based on their attempts to convince other students.

4-6: Have students poll a segment of a school or community on several energy issues. Have them determine percents of responses to these issues. They might also want to work with fractions using this method.

LESSON 2-4: WHAT INDIVIDUALS CAN DO

Rationale

Students have studied energy problems, actors, and issues. They now need to learn some skills not only in how to analyze but how to put their knowledge to use. They need to be able to act in important ways. One way in which they can act is as an individual trying to solve energy problems.

Here students will learn a basic set of activities which will help them to make better decisions. They have already learned a decision-making skill. However it is important that they think about a problem before they make a decision and act in ways in order to follow through on that decision. Here they will learn important skills which surround the basic decision-making act.

Objective

Students will learn important skills in carrying out activities as individuals in solving their own energy problem. Teachers can assess the attainment of this objective through students' responses to Activity E of this lesson or through Assessment Activity Two at the end of this chapter.

Main Activity

A. Lead a discussion with students about what they think they can do as individuals about energy problems. You should have a long list on the blackboard of concrete things that they think they can do or have done in this course in trying to help the energy situation. The purpose of this discussion is for students to see that individuals can do a lot to try to conserve energy.

B. Now use the picture enclosed with this lesson in order to show students some ways in which people do things. In this case the person in the picture is doing something about his/her energy problem. The first step is thinking about it. The first part of this picture shows this thinking activity. Thinking creates awareness and builds a basis for decisions. Without it we do not have good decision-making. In the second part of this picture, the individual is making a decision about the energy problem. The third part of this picture shows action being taken as a result of that decision. The fourth part of this picture shows something that a lot of people forget--following through on the activity. There must be follow-through in order for action to take hold and have an impact. Students should see that these four dimensions constitute important stages through which indivi- act in doing something about the energy problem.

C. Pick one or two examples students have given of concrete things that they can do about the energy problem and go through the steps in doing something for that particular activity. Have students talk about the thinking that went behind it, the decision that was made, the action that was taken, and how there was follow-through. Students should be able to see that these are common stages for any activity that individuals will undertake.

D. Now have students pick a book or a story that they are reading and have them show how a major character in that story is thinking about a problem, deciding what to do, acting based on the problem, and then following through. Have several students talk to the class about their examples and how they are relevant to any activity which individuals would undertake.

E. Now have students meet in groups or as a class about their own energy problem. Have them talk about the steps in taking action. Have them talk about what kind of thinking needs to go behind their activities, what decisions need to be made, what actions need to be taken, and how follow-through will be accomplished.

F. Have students show the class their steps in carrying out a solution to their energy problem. Have their class make suggestions about some different ways that thinking, deciding, acting, and following through could be carried out by the students. By the end of this discussion they should have a firm idea of the kinds of activities they will carry out in relation to the energy problem that they have suggested.

Grade Level Adaptation

K-1: Talk with students about some things they can do in their classroom or their homes about energy problems. Go through the four steps of thinking, deciding, acting, and following through. Then have students use puppets to show a decision being made and how the four steps are being carried out.

2-3: Use the pictures that accompany this lesson to illustrate for students the stages in individual action on the energy problem. Then have them talk about one thing they have done or can do which follows the four steps.

Language Arts Adaptation

K-1: Have students draw pictures about someone taking action on an energy problem. Have them describe the four steps that the individual is going through.

2-3: Ask students to pick out a character in a story which they have read and show how that character goes through the four stages of taking action.

4-6: Ask students to develop a story about how an observer might comment on their own activity in relation to an energy problem. The observer might be their teacher, their mother, their father, or a friend. Have them write the story from the point of view of the observer describing and evaluating their activity.

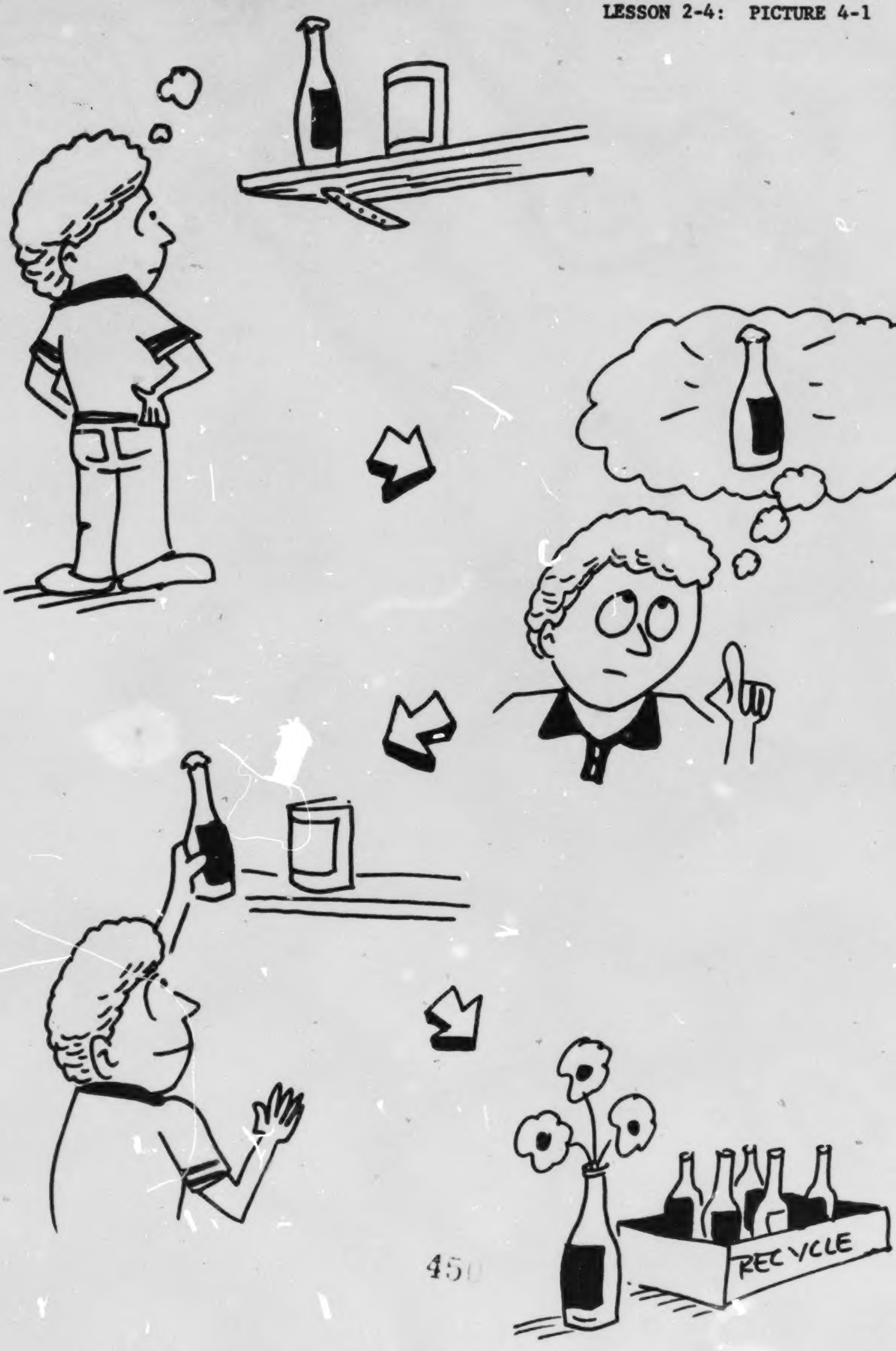
Math Adaptation

K-1: Bring in a set of pictures and have students group them according to whether someone is thinking, deciding, acting, or following through on an activity.

2-3: Ask students to group a set of pictures under each of the four categories. Have them count the number of instances that appear in each category. They may want to add or subtract items under categories or multiply them if the pictures appear in more than one category.

4-6: Ask the students to study the front page of a newspaper and to find the total number of activities which involve thinking, deciding, acting, and following through. Have them determine what fractions of the total number of instances they have that are devoted to each of these four categories.

LESSON 2-4: PICTURE 4-1



LESSON 2-5: GROUPS SOLVING ENERGY PROBLEMS

Rationale

The intent here is for students to see how groups can also work to solve energy problems. They will see a dialogue of a group making a specific plan for a community project in energy conservation. They will see how there are differences between individual and group problem-solving, and that the chief difference is in the rules for making decisions. Students will see how they can work in groups in their own everyday lives to help solve energy problems.

Objectives

1. Students will recognize how groups can function to help solve energy problems.
2. Students will develop skills in group decision-making, applying them to their local energy situation.

Main Activity

A. Read the enclosed dialogue with students, or have them take parts in the dialogue about the energy problem in Unionville. The dialogue was designed for students to see how a group makes a decision. Students should be able to see how information is gathered by a group, how alternatives are generated, how choices are made, and what the consequences of the decision will be. Different groups have different rules by which they make decisions. When students have read the dialogue, or you have read it to them, ask them about the different steps in the decision-making process, and ask them what kind of rule is used in order to make a choice between alternatives.

B. Then explain to students what different kinds of decision rules can be used by groups to make choices. This is the main difference between group decision-making and individual decision-making. There are four different types of rules.

   1. One-person Rule. This is where one person can decide. Perhaps the head of the group or some other individual can make a decision about how the group will act.

   2. Minority Rule. This happens when a few people can decide. It is not most of the people, but a small group of people who can make a decision. Often these may be the officers of the group, or an executive committee of that particular group.

3. Majority Rule. This is a familiar rule for most people. When half plus one of the individuals agree to a decision, then group will carry out that decision, even though a minority might object.

4. Consensus Rule. This is when everyone must agree in order for a decision to be made. This rule is a hard rule for groups. If one person objects, then no action can be taken.

   Students should discuss the dialogue in terms of the decision rules and decide which rule is used in the Unionville case.

C. Students should study the enclosed cases in terms of the decision rules that are used. They should see how people act differently in the different groups and speculate about how they might act in a group under decision rule. Generally, under one person and minority rule, an individual tries to persuade the individual or the minority about what is best. They need not worry about the rest of the group. For, if only a few make a decision, then they must be sure the leaders do not object. In majority rule, there is a lot of compromise involved. Everyone must be polled and see where most people stand. The object here is to convince most people of your position, and generally, appeals are made to the group as a whole. When everyone must agree, then people must find out who is much strongly opposed, and try to influence those who may veto the decision. This type of activity is different from group to group according to the decision that is made. Students should study the cases and answer the following questions:

   1. What type of decision rule is operating here?

   2. How do people try to get their way in the decision?

   3. What was the result of the decision?

   4. How might you have acted in this group in order to get a decision made?

D. Now talk with students about the decision rules that operate in the problems that they are trying to solve. Have them make one or two suggestions about the various group rules that are relevant to their own energy problem. Talk about the actors that are involved and what groups of actors are involved and what decision rules they have. Then have students break into groups and have them study what groups are involved in their energy problem and what decision rules they use in order to make decisions. Have students think about how they would act differently depending upon the rule that is used. Then have students talk with the class about the groups, the decision rules, and their own actions that they would take in those groups in order to solve their own energy problem.

E. Depending upon the groups and the rules that students choose, you may want to structure the class in a way that will help students to see how they could act in a group situation. Have the students in a group that is solving a particular problem state the decision rule that is operating in the group that they are trying to influence. Structure the class according to that group and that decision rule. Then have the people who are trying to solve their energy problem try to get a decision made with the class acting as the referent group. Do this for each problem that the students are trying to solve. It will give them practice in acting on different decision rules.

Grade Level Adaptation

K-1: Read the students a story that involves a group decision. Ask them what decision rule was used in this case. Then have them think of cases in their own everyday lives where groups used a variety of decision rules. You may include their families, their class, clubs that they belong to or sports teams.

2-3: Ask students to describe four groups that they know and what decision rules are used in each. They should talk about the pros and cons of those decision rules and how they act differently under different decision rules. Then have them relate how different decision rules would cause them to act differently in problems that involve the energy situation.

Language Arts Adaptation

K-1: Read another story to the students and have them select what decision rules are being used by the people in the story.

2-3: Ask students to divide into two teams. Have them alternately give a decision rule and an example in which it is used until all the people on one team make a mistake. The team with the most number of players left at the end of the game wins.

4-6: Ask students to write about a group that they know. They might want to write a short essay or to describe how a group they know helps to solve an energy problem. Be sure they recognize what decision rule was used.

Math Adaptation

K-1: Have students count the number of groups that they know that use each of the four decision rules.

2-3: Have students study the rules that they use for addition and subtraction. Explain to them that these kinds of rules for mathematics are not much different from rules that are used for decisions that are made in groups. Students should understand how mathematical rules and decision-making rules are similar.

4-6: Talk with students about a variety of different size groups. Ask students how many people it would take to make a decision in each case under different decision rules. You may want students to design an ideal group size in order for a given decision rule to work. Most functional mathematics can be applied in order to create solutions to the question of group size and decision rules.

ENERGY IN UNIONVILLE

There is a problem in the fourth grade class at Unionville Elementary School. The class is deciding how they might save on oil products in their classroom. They use a great many of them in pens, crayons, plastic containers, and other oil products. Mark is leading the discussion. The dialogue begins as Mark presents the problem.

Mark: We have a problem here. We are using plastic products that are made from oil. Oil is a valuable energy source. We should conserve as much oil as possible. Therefore, I think we need to come up with some alternatives to the plastic products we use.

Suzie: We could use pencils. In this way, we would be using a wood product instead of an oil product. We need to be careful because wood is also scarce.

Ann: This really isn't important. What we do doesn't make a difference. It's what all of those corporations and businesses do that use millions more pens than we do.

Mark: It is important! What everybody conserves counts.

Tom: Let's take a poll and list the most important things that we can do, so we can find out what people in the class think.

Suzie: Well, we really should do them now. Why take a poll? We should list as many things as we can, and then just do them.

Sherry: We need to make a decision that everyone can agree on. It's not so hard. Let's just take a poll and see what we can do.

Barry: Let's take a majority vote on what we're going to do. We could do a poll, and ask people what it is that they think is most important to do. We could make a list and decide that we are going to do them now.

Mark: Okay. Let's have a vote.

The class voted and 24 people voted for the poll, and 15 voted to do everything that would be listed.

Mark: Alright. We're going to do the poll. Now who's going to do it?

Ann: I'll help write the poll. And then we can figure out what it is that's most important to do.

The class did their poll, and decided that they were going to use pencils instead of pens, they were not going to use plastic containers in the classroom, and that they were going to substitute chalk for crayons. Several other decisions were made which minimized the use of oil products. Students were proud of themselves. Throughout the year, they continuously substituted other products for those which used oil. They had made their contribution to the solution of one energy problem, and other classes followed their example.

THE ADAMS FAMILY AND SOLAR ENERGY

The Adams family was a typical family living in the southwestern United States. They lived in a middle class suburb, where Mr. Adams worked as a dentist. Mrs. Adams stayed home with the children, John and Susan. John was in the fifth grade and Susan was in the eleventh grade.

John learned about energy education in his social studies class. They had been studying solar energy and ways that the energy from the sun could be used to replace those energy sources, like coal and gas and oil, that were in short supply. The sun, John knew, had permanent energy. It was not in short supply, and would last forever.

John had been learning a lot about using solar energy in homes for heat. Since they lived in the southwest, they received a lot of sunlight, and needed very little heat in the winter. He thought that it was a perfect place to install a solar energy system. He talked with Susan. She had read about the system and learned that it would pay for itself within 10 years, in terms of savings that they would make on their electric bill. John and Susan agreed that they should see if it would work in their home.

One day John and Susan presented the problem to their family. Their father was opposed. He thought that it was too expensive. He explained that they did not have the money to invest in a solar energy system, and that he was not sure that it would pay for itself. Besides, it was complicated and he did not think it would work.

John pleaded with his mother. Mrs. Adams said that she did not think that they necessarily had enough sun to heat their home. She did not want her children to be cold, and did not want to go through the construction of a solar energy system. She did not want her house torn apart by construction for something that might not work.

Susan pleaded with each member of her family. She wanted very badly to install the system. She said that in the long run it would save money, that there was surely enough sun, and that heat was actually stored by a solar energy system, so that it could be used any time they needed it.

John made a special plea to Mr. Adams. He said that it would not be expensive in the long run. He explained to his father how the system would work, and how it was made. His father was hesitant. He hated to deny his son something that he thought was important. On the other hand, he did not want his family to suffer.

Finally, Mr. Adams gave in. He said that he had been convinced that they should install a solar energy system. He said that he would cover the expense and Susan could take a job in order to help with the family vacation. John actually volunteered to take a job, too, and Mrs. Adams said that any small contribution he could make was important.

So the solar system was installed. The heat was enough to provide adequate heat for the Adams family in their home. The whole family benefited from it, as they saved over 2/3 of the money they normally spent on their electric bill. In addition, other families in town began to follow their example and installed solar energy systems. In the long run, the important and precious fuels available in the United States were saved by the Adams family and others who joined them.

CONSERVATION IN THE KINDERGARTEN

The kindergarten at North Central Elementary School was not unusual. It was filled with five, six and seven-year-olds who were curious and enjoyed a great many things. They had a good teacher. They were especially interested in getting along together doing a lot of projects. This particular class enjoyed doing things as a whole class, rather than as separate individuals.

Sally was a member of that kindergarten class, and Sally had a problem. Her parents had told her that it was important to conserve energy. She realized that lights were part of the energy problem. Her eyes were affected by the glare of lights and she needed to cut down lighting in places where she worked and played. She decided to bring the problem to her class.

First of all, she told the teacher about it. She said that there were two reasons why she would love to cut half of the lighting in the elementary cloak room. First of all, it hurt her eyes, and she needed to be in a situation where there was little glare. She thought it would probably be easy to cut down half of the lights without suffering. Secondly, she was interested in energy conservation, and she talked to her teacher for a long time about how schools used a lot of energy and how they used lighting which was unnecessary.

The teacher said that they should probably discuss the problem. The entire class had a discussion. Sally spoke in front of the class. She explained the problem with her eyes and the problem with energy conservation. She asked students whether or not they'd like to try it for awhile, to see whether or not anyone was hurt by it.

The teacher asked the class to vote. Most of the students wanted to have half of the lights turned off. They were willing to try it for awhile to see whether or not it made a difference to them. But they also wanted to respond to Sally's problem.

The class did try it, and it turned out that they did not need half of the lights in the classroom. They got along perfectly well without them. Students were pleased with this decision and they told the principal about it. The principal passed the message on to other classrooms in the school, and over half the classrooms in the elementary school decided to cut their lighting. This allowed the school to conserve almost 5% of its energy consumption, and to provide students with a way to help in the energy problem.

APPLE CITY SAVES ENERGY

The students of Apple City Elementary School were studying the energy problem. The fourth grade was adamant about the need for energy conservation. They decided they wanted to help the city solve one of its energy problems. The city was largely using coal to generate electricity, heat, and other supplies for the community. Coal was running low, as it was in the general area in which Apple City was located. There needed to be solutions to the problem; both conservation and alternative methods of energy supply needed to be discussed.

Pete was the head of the fourth grade class. He decided to form a task force. A task force met, and decided that they could form a checklist for community reference. The checklist would indicate ways in which they could save on electrical energy, as well as home heating and air-conditioning, which was generally powered by coal.

The task force went to the principal, who said that the students should present their ideas to the entire student body. An elementary school student meeting was scheduled. All 800 students in the school attended. Pete said that unless everybody wanted to get involved in the activity, it would not work, and it would not be representative of the school. Students decided by a unanimous vote that they would help as volunteers to go door-to-door to community residents and inform them of the energy checklist on ways to conserve energy.

The students met in small groups on a class-by-class basis, discussed the checklist and ways that homes could conserve energy. They then spent two months going door-to-door and explaining to residents in the community ways in which they could conserve energy. When students did not want to go alone, they went in small groups and visited homes together so that they could make their point.

The local radio station picked up on the students' energy program. It ran a contest among areas in the city to see who could conserve the most energy. Pete was proud. His block and the block next to it were grouped together as an area and they conserved almost 50% of their energy and won the contest.

All in all, Apple City conserved almost 20% of the average energy they used per year. They now had more coal for the future and had found ways in which residents could easily contribute to their energy problem. Pete was proud, and so were the students at Apply City Elementary School. The residents were cooperating in a community-wide effort at energy conservation.

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LESSON 2-6: ENERGY AND YOUR VALUES

Rationale

In order for students to see the value choices they make in their energy project activities, they need to come to grips with their own values. They need to be able to see what values they have, and apply them to their decisions about energy.

This lesson focuses on valuing. It is a skill lesson. Valuing is the heart of making decisions about energy. Our purpose here is to have students value energy and to apply their values to decision-making about energy alternatives.

Objective

Students will acquire basic valuing skills in making energy decisions. This skill can be assessed by students' responses to the issues in Activity F of this lesson.

Main Activity

A. Talk with students about how some things are valuable to them. Some things they can see, such as money or a new bicycle. Other things are less obvious. Some people value friendship. Others value truth. Have students make a list of the things that they think are valuable in their lives.

B. Talk with students about how things are valuable because they have *values*, or principles or ideas that they live by that are important to them. Ask students to create their own list of *values*, or ideas, which they think are important in guiding their lives. Their list might include democracy, friendship, truth, justice. Have students feel free to create as long a list as they want which identifies their important values. Discuss with students how their values may conflict. Be sure to save this list on the blackboard.

C. Talk with students about how energy also involves values. Making a decision to turn off lights or not to use heat involves basic values about saving, about sharing with others, and basically, about truth, friendship, and democracy. Have students make a list of values that they think are involved in making decisions about energy. Put this list on the board next to the list that they have made in Activity B.

D. Now have students gather information from newspapers or magazines about energy. For the story or the picture that they gather, have them indicate which values they think are important in the issue or problem or situation that is being described.

or

Bring someone into the class who can talk with students about energy problems and the basic values that they think are important to saving energy.

or

Ask students to collect or draw cartoons depicting an energy problem and the basic values that are involved in solving it.

E. Tell students that the principal way in which values become involved in action on energy issues is in making decisions. Every time a decision is made, a choice is made between different ways of doing things. For example, in turning out the lights, or leaving them on, students make a basic decision. If they turn out the lights, it is usually because they are expressing a value, such as saving. If they leave the lights on, they are normally expressing a value which involves seeing, or feeling comfortable, or not caring about spending money or using electricity. Describe for students a situation in which they have a choice as to whether or not to use the lights, and then guide a discussion with the following questions:

1. What values are involved in the use of lights? (i.e saving energy, helping others now and in the future)

2. How do those values help you choose the way you are going to use lights? (i.e. They are more important than having a lot of light.)

3. How do those values help you see what the outcome of using the lights will be? (i.e. I know I will save energy in accordance with my values.)

F. Divide students into groups, and have each group select a particular issue. The issue might be heat, the use of cars, the use of paper, plastics, or television. Students can pick their own energy-related issues. Have them think about what values are involved in using the energy, how the values help them to choose what they will do with the energy, and how the values help them to see the outcomes of what will happen if they use the energy.

Then hold a class discussion around the following questions:

1. What values were involved in these issues?

2. How did the values help you in making a choice about how to use the energy?

3. How did the values help you to see the outcome of using the energy?

4. Why were one group's values different from or similar to others?

Be sure the students understand that people's values differ and they need to have respect for others' values. When any individual or group makes a choice, it may be based on a different set of values than that of another group. The important thing here is that people realize what their values are and use them as guides in making decisions.

G. Have students outline one thing they think they can do to save energy and the ways that their own values enter into decisions they make about their energy project. Discuss with them whether or not their values are upheld by the activities they have planned. Help them to determine the outcomes of their activities and whether their values continue to be upheld.

Grade Level Adaptation

K-1: Have students focus on one value, such as "saving." Work with them to see how they apply their value of saving to the energy situation.
2-3: Use pictures of people saving things to begin this lesson. Talk with students about how saving is an important value. Have them relate saving as a value to one energy decision that they have made or will make as an individual or as a class.

Language Arts Adaptation

K-1: Have students use puppets to act out ways of saving energy.
2-3: Have students pick out ways that values enter into energy situations in stories that they are reading.
4-6: Have students write a story about how they have saved energy and the values that are involved.

Math Adaptation

K-1: Have students count how many ways they might save energy.
2-3: Have students see how many people support different values in their class. They might add or subtract, multiply or divide these combinations of numbers they give from their class survey.
4-6: Talk with students about how values can or cannot be quantified, using the math functions that you are currently teaching.

ASSESSMENT ACTIVITIES FOR CHAPTER TWO

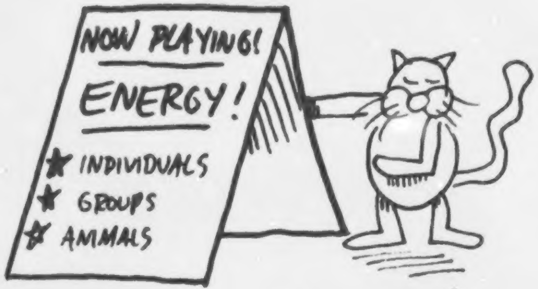
These two assessment activities are designed to evaluate students' knowledge of energy problems, actors, and issues. They also assess students' knowledge of individual and group problem-solving skills. The activities can be used after appropriate lessons, or at the end of this chapter.

Assessment Activity #1. This activity evaluates students' knowledge of energy problems, actors, and issues. The correct answers to the scrambled words are: 1) ACTORS; 2) PROBLEMS; 3) ISSUES.

Assessment Activity #2. This activity evaluates students' knowledge of individual and group problem-solving. Students should develop two short essays about how individuals and groups in the pictures are taking action on energy problems.

FILL IN THE BLANKS WITH IMPORTANT ENERGY CONCEPTS. USE THE SAME LETTERS THAT APPEAR IN THE CARTOONS AT THE RIGHT!

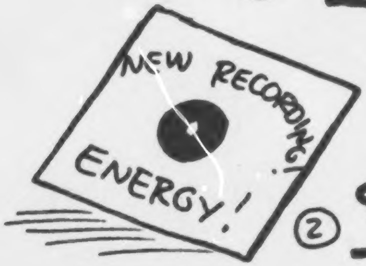
① INDIVIDUALS, GROUPS, AND EVEN ANIMALS ARE ENERGY ________!


NOW PLAYING!
ENERGY!
★ INDIVIDUALS
★ GROUPS
★ ANIMALS

① CO-STAR!

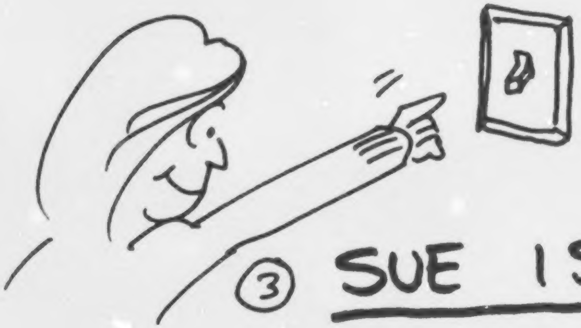
3-91

② SHRINKING SUPPLIES, LARGER DEMANDS, THE NEED FOR A CLEAN ENVIRONMENT, AND THE HIGH COST OF ENERGY ARE EXAMPLES OF VERY SERIOUS ________.

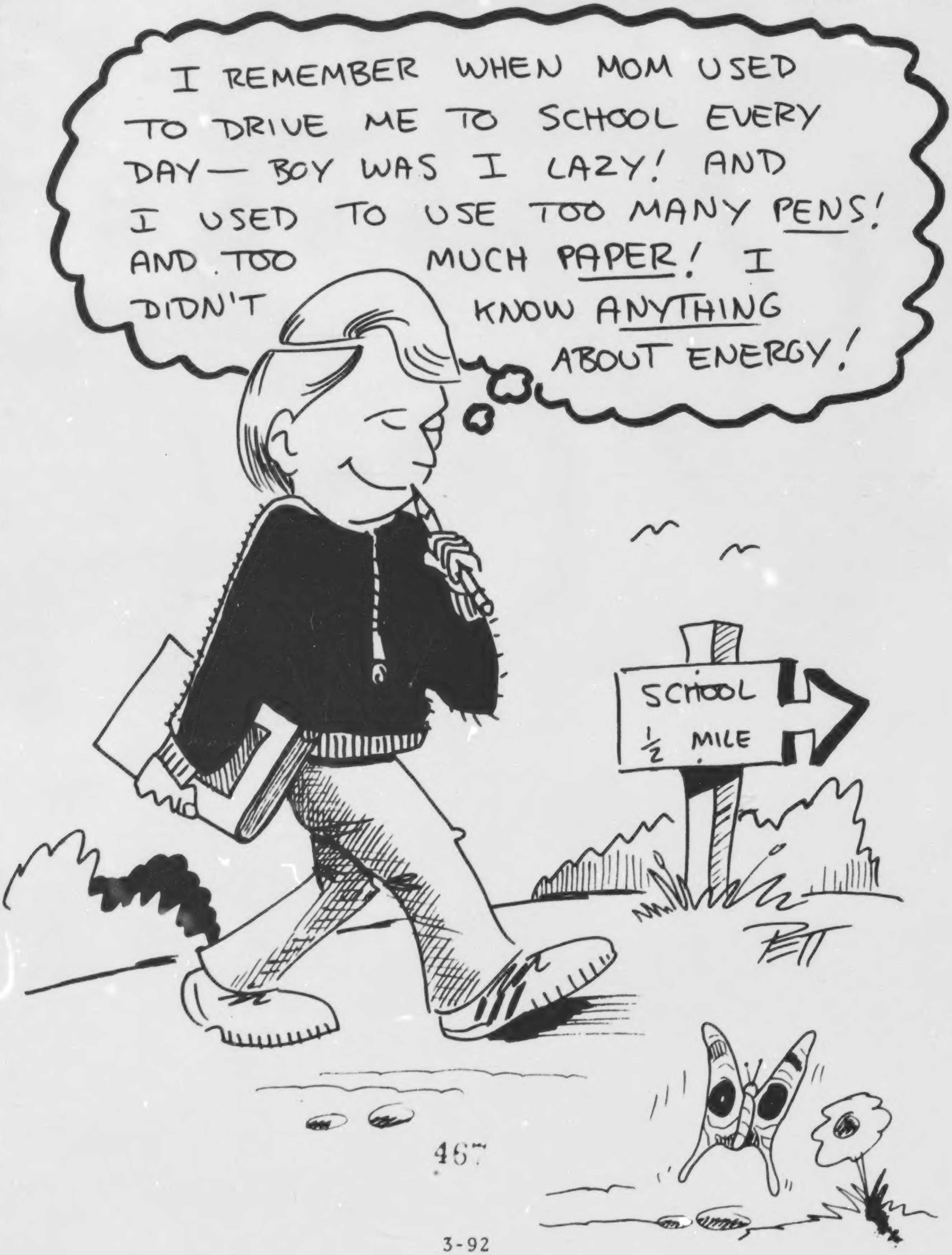

NEW RECORDING!
ENERGY!

② SOMBER L.P.!

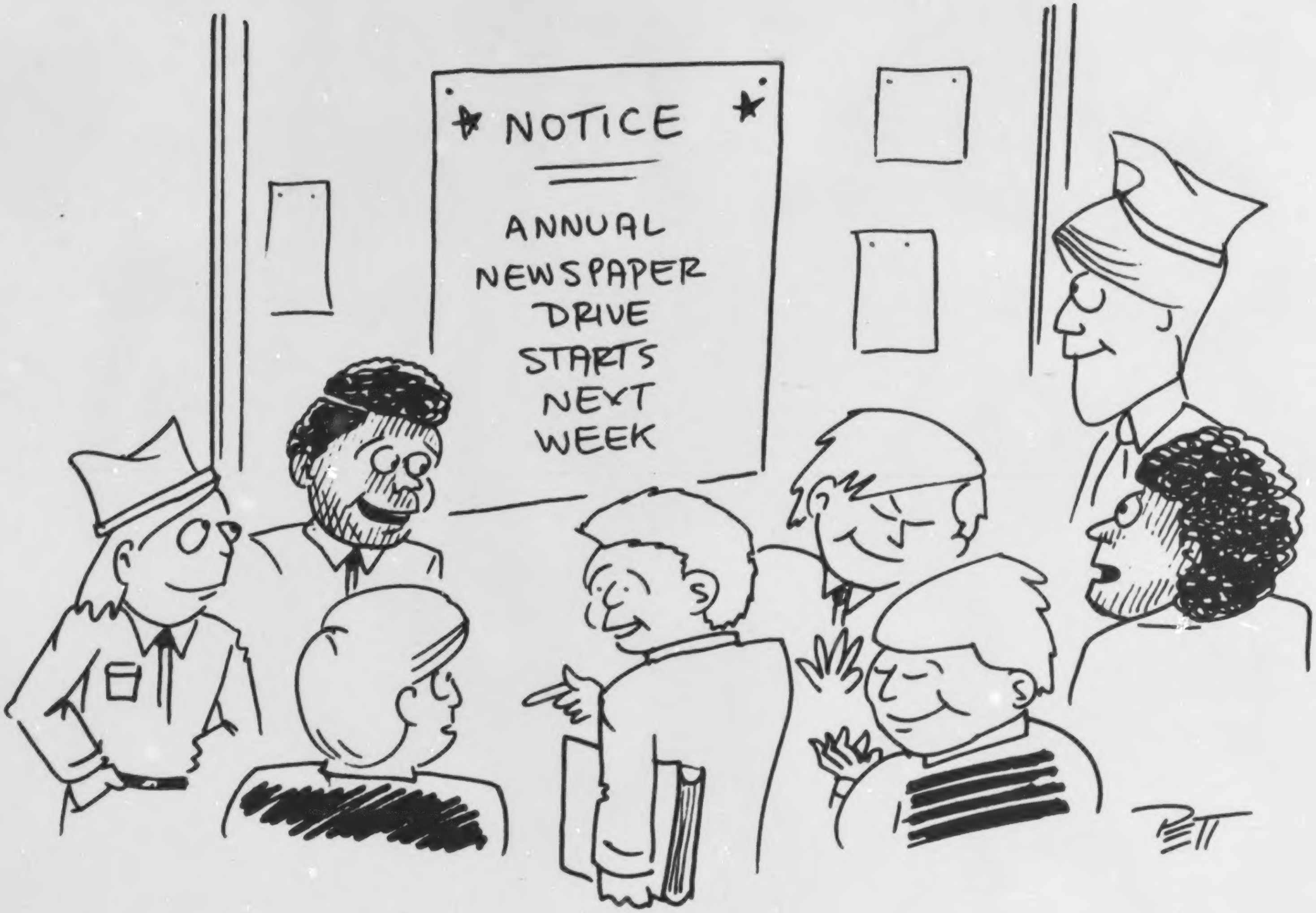
③ WHETHER OR NOT CONSERVATION IS NEEDED IS NO LONGER AN ________. WE DEFINITELY NEED TO START NOW!



③ SUE IS!


I REMEMBER WHEN MOM USED TO DRIVE ME TO SCHOOL EVERY DAY— BOY WAS I LAZY! AND I USED TO USE TOO MANY PENS! AND TOO MUCH PAPER! I DIDN'T KNOW ANYTHING ABOUT ENERGY!
SCHOOL ½ MILE

3-93


NOTICE
ANNUAL NEWSPAPER DRIVE STARTS NEXT WEEK

CHAPTER THREE: ENERGY OUTCOMES AND THE FUTURE

Rationale

In this final chapter, students will explore how people's actions have outcomes for other people, and for the planet as a whole. They will think about the future energy situation, and make their own plans for energy conservation. Hopefully, students will carry out their plans beyond this course as part of their everyday lives.

Objectives

1. Students will apply their knowledge of energy and problem-solving to a situation that is important to them (Lesson One).
2. Students will know a variety of outcomes of the energy situation for people (Lesson Two).
3. Students will be able to define and give examples of global energy interdependence (Lesson Three).
4. Students will know the basic steps involved in forecasting energy alternatives (Lesson Four).
5. Students will apply their knowledge of forecasting to their own everyday lives, now and in the future (Lesson Five).
6. Students will apply their knowledge and skills to developing their own plan for energy conservation (Lesson Six).

LESSON 3-1: TAKING YOUR OWN ACTION

Rationale

This lesson focuses on students taking actions they have planned for the last five lessons. They will tackle an energy problem in their school, home, or community which they have identified and studied.

This participation activity is the essence of energy education. Students will apply their knowledge and skills to actions that are important to them. They will practice saving energy. It is only through practice that important habits can be changed.

Objective

Students will apply their knowledge of energy and problem-solving to a situation that is important to them. Assessment of achievement of this objective can be made by students' reports in Activity C of this lesson.

Main Activity

A. Review with the students the main dimensions of their energy problem. Either review the class project or review each group's definition of its problem. You should review their situation and discuss the following questions.

   1. What is your energy problem? (i.e. turning off lights, saving heat, recycling products, driving fewer miles, organizing a community campaign for saving energy)

   2. What actors are involved in your energy problem?

   3. What issues are you trying to solve?

   4. What actions are you thinking about doing?

   5. Why are these actions important?

B. Then help students actually plan how to take action on the problem they have defined. Have them use the sheet on taking their own action which is enclosed with this lesson. Help them to respond to each of the sections of the form. You may want to talk orally about each of these sections and put the answers on the board. Or you may want students to work in groups. They should, through this discussion, define the problem that they are trying to solve, talk about the information they need in order to solve it, outline the people who are involved in working on the problem, determine who will do what in tackling the problem, decide at what time each person will take his or her action, and finally, decide on what form the report will take. You should go through each one of these steps with the students, and help them to work out a realistic and well-reasoned plan for taking action on their problem.

C. When students are taking action on their problem, you should talk with them regularly about how they are progressing and the kinds of plans they have made. You may want students to give oral reports to you on a regular basis. You may want them to keep written logs of their activities so that they can remember what they have done. You should be a central stimulus and resource for students as they are carrying out their activities.

D. Have students give reports to the class on their success in taking their own action. They may make these reports in oral or written form, or use visual aids, such as pictures they have made or pictures or articles that have been taken from newspapers or magazines. They can present these reports to other classes in the school or groups in the community via P.T.A., newspapers, etc.

E. When students have completed their reports, have the class as a whole help to make a set of recommendations about how other people might save energy. Write these recommendations on the board. Then have students be sure that letters or memoranda are sent to the proper people who make decisions in this area so that others may learn to save energy. Be sure to report back to students on the responses that are made to their recommendations.

Grade Level Adaptation

K-1: Be sure that the problem that students have is one that they themselves can do something about. Help them with the steps and how to solve that problem. Talk with them individually about their progress in working on their energy problem or have all the students draw their progress on "butcher" paper on the wall.

2-3: Guide students through the steps presented in Section B, one at a time. Be sure that they are thoroughly discussed. Have students make an oral report on the success of their actions.

Language Arts Adaptation

K-1: Have students use a tape recorder to talk about their attempts to take action on an energy problem.
2-3: Have students give oral or written reports on their success in taking energy action
4-6: Have students keep daily logs or slide-tape shows. Structure those logs or slide-tape shows so that you can stress the language arts skills you are now currently teaching.

Math Adaptation

K-1: Have students talk about the energy that they have saved as a result of their action. They can explore the concepts of "more" or "less" or other measurement concepts based on their actions.
2-3: Have students measure the energy that they have saved and talk about how they might save more energy.
4-6: Have students chart their progress in saving energy according to a mathematical function that you are currently teaching. They can include these measurements in their logs on a regular basis.

LESSON 3-1: TAKING YOUR OWN ACTION

1. My Energy Problem ____________________

2. Information I Need ____________________

3. People ____________________

4. Who Will Do Things ____________________

5. When We Do Things ____________________

6. Report ____________________

LESSON 3-2: OUTCOMES FOR PEOPLE

Rationale

The concept of outcomes is an important one to consider. It is one of the reasons that the energy problem is so crucial at this particular point in time. Students should understand that in the short or long run the energy problems will worsen and what they do will have an impact not only now but in the future. In this lesson students will study the outcomes that happen to people. Later on they will see the outcomes for non-human objects on the planet.

Objective

Students will know a variety of outcomes of the energy situation for people. Teachers can assess the achievement of this objective through students' responses to Activity F of this lesson or through Assessment Activity One at the end of this chapter.

Main Activity

A. Take a situation that students can understand which will demonstrate an outcome to them. Suppose that their favorite books were misplaced or stolen or ruined in a flood or a fire. Ask them what the outcome would be. They could not learn as much. They might not even be in school if a true catastrophe happened. On the other hand, people would probably help them out and try to replace the books. Every event or set of activities has an outcome. Be sure that students understand that outcomes are important reasons why people do things.

B. Talk with students about how the energy problem has outcomes for people in the same way that the loss of books or some other material has an outcome for them. A great many people are affected by the energy problem. Use the picture 2-1 that is enclosed with this lesson to show what the worst outcomes would be if people did not save any energy at all. Not saving energy would affect their homes, their work, their school, and the nation as a whole. Schools, for example, would not have electricity. Homes would not have heat. People would be out of work because industries could not function. There would be such a scarcity of energy sources that people would have a hard time finding the things that they need, from the clothes that they wear to necessities in their homes. There would certainly be no cars, television, or other types of intensive energy users. Talk with students about the pictures and then have them draw examples from their own everyday lives at home and at school.

C. Now create a fictional situation with students. Ask them to imagine that there is no energy source available to them. They can use oil, coal, gas, or some other source that is important in their own community. Ask them to try to live their lives for half a day, a day, or an hour, doing without products that come from this energy source. If you pick oil, for example, they will have to do without many of their clothes, without cars, and without a lot of plastic products. Have students make a list of the things that they could do without and what they absolutely could not do without if there was no oil to be used in their everyday lives. Students should realize how important the impact of not having any oil would be on things that they do every day. They could not use pens, they could not use plastic, they could not use any form of transportation which used oil. Have students share their lists with the class and talk about how devastating a complete shortage of energy could be for people like themselves.

D. Discuss with students how most people would say that we will not completely run out of energy sources but our lifestyle will be different. That is why changing habits is such an important part of solving the energy problem. Use pictures 2-2 and 2-3 that are enclosed with this lesson. Talk with students about what differences in lifestyle will be important if energy is saved. Talk with them about how less electricity will be used, about how people will drive smaller cars and will drive them less often, and about other changes in lifestyle which are reflected in the pictures. Students should realize that even under the best of circumstances peoples' lives will be changed. The degree to which they will be changed depends upon how people act on the energy problem both now and in the future.

E. Again take a situation of an energy source such as oil. Have students list all of the ways in which they use that energy source, then have them think about what ways they could cut back on that energy source in order to preserve it for the future.

F. Now ask the students to find one article which reports about outcomes of the energy problem on people. Have them be prepared to make an oral report about the outcomes and include a discussion of their own values about the situation and how it can be minimized by energy conservation.

G. When students have made their report they should discuss the energy project that they have undertaken and what the outcomes of that project could be. They should think of at least one way in which they can insure that the impact of their energy conservation will be maximized for both the short and long run.

Grade Level Adaptation

K-1: Discuss with students the idea of outcomes based on a class experience which you have had recently. Then talk with them about the outcomes brought about by the scarcity of one energy source, such as oil.

2-3: Use the pictures that are enclosed with this lesson to discuss the concept of outcomes with the class. Have students relate how each of the outcomes in the pictures affect their own everyday lives.

Language Arts Adaptation

K-1: Ask students to use puppets in order to show how actions that are taken in the energy situation have outcomes for other people.

2-3: Have students construct a diorama of their classroom or a home as it would look if there were a severe shortage of energy sources. Have them explain what sources are missing from the diorama.

4-6: Ask students to develop poems regarding their ideas about outcomes of the energy problem. Ask several students to read their poems aloud in class and hold a class discussion about possible outcomes.

Math Adaptation

K-1: Talk with students about what energy products they would need to use less because of scarce energy sources. Have them understand that some sources are more scarce than others and use this vehicle to teach them the ideas of more or less.

2-3: Have students total all of the items that they use every day that use oil. Now have them subtract the items that would be first to go if there was an important energy shortage.

4-6: Ask students to do a survey of their school and the energy products that it uses. Then have them subtract the first items that would be used up, the second, and the third, so that they can rank items according to their likelihood of not being able to be used.

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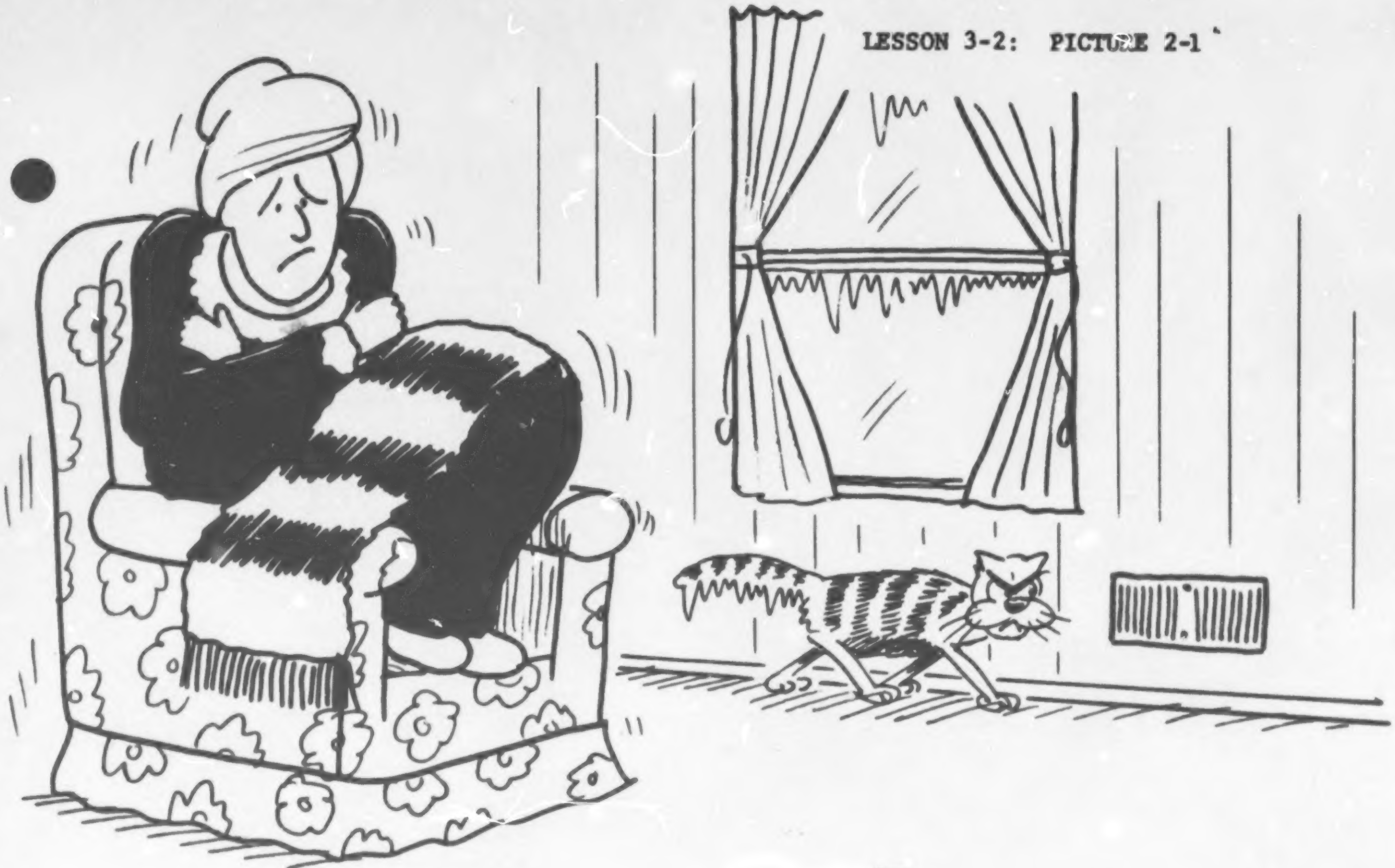
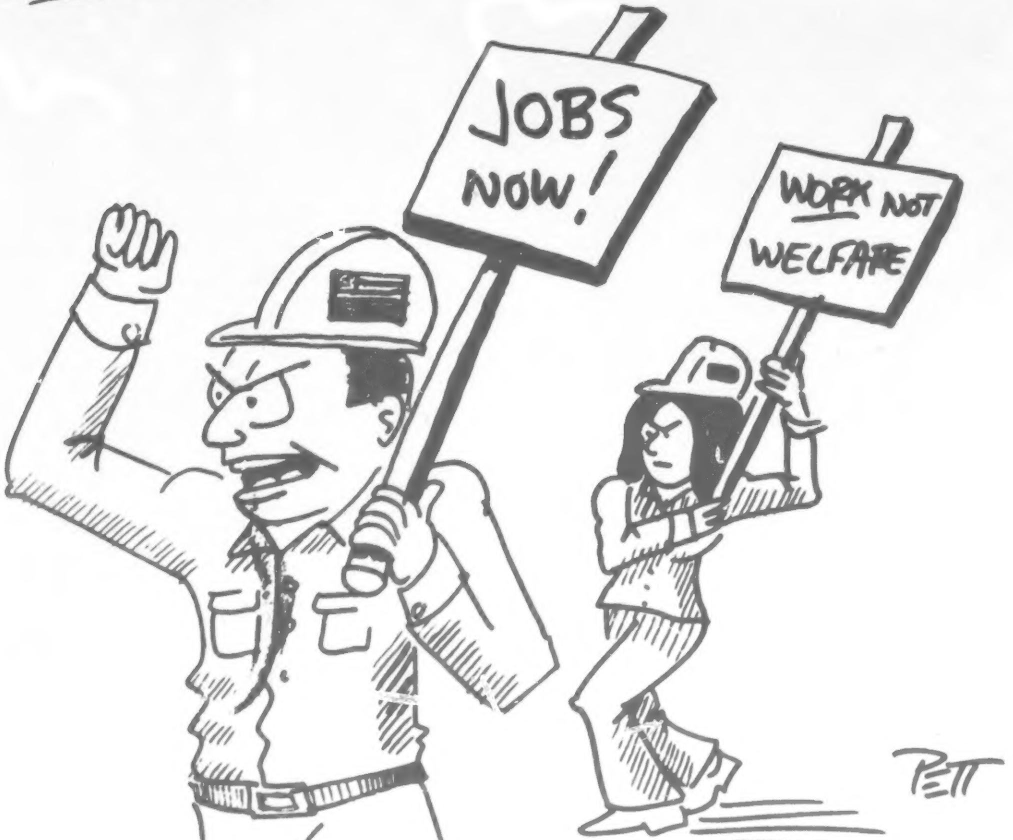
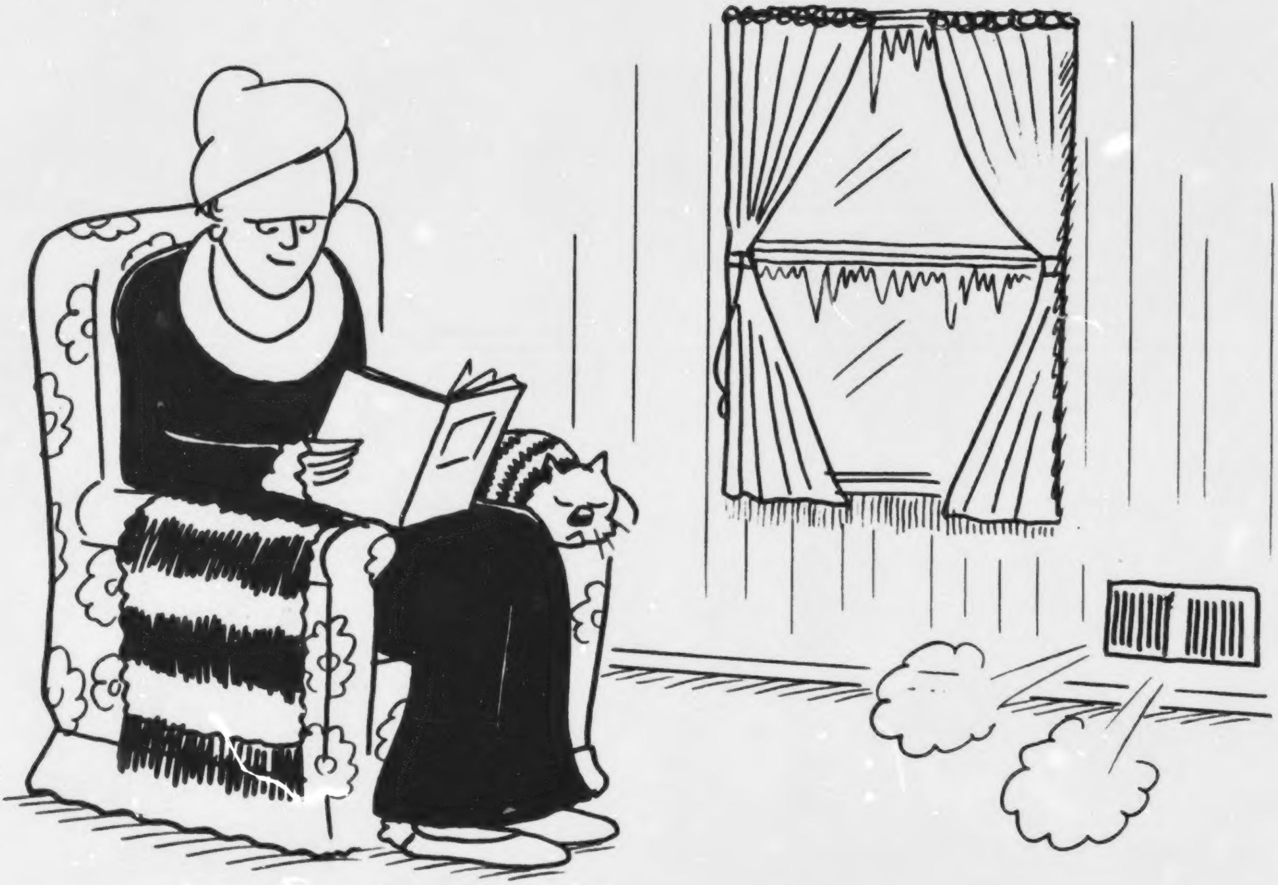
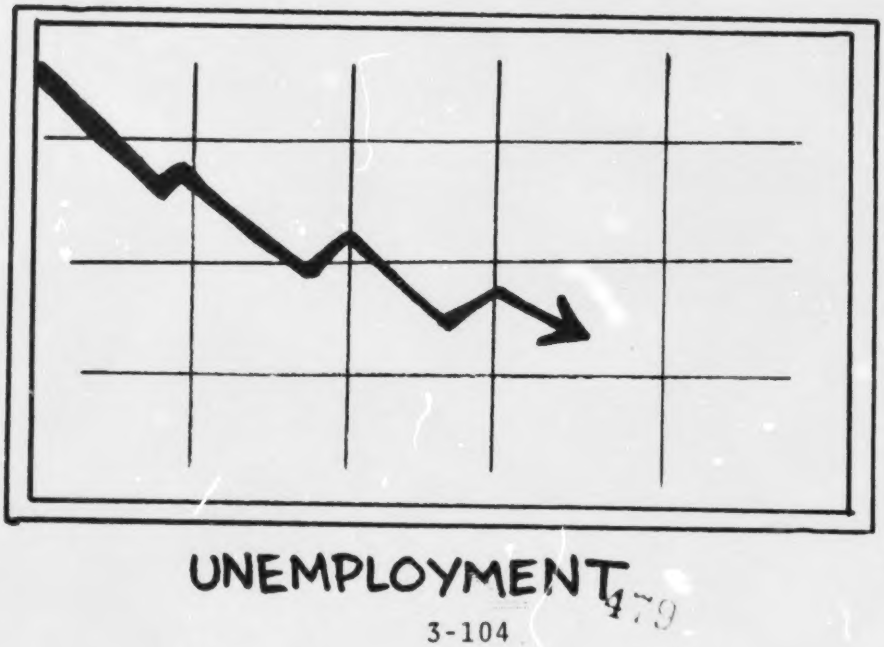
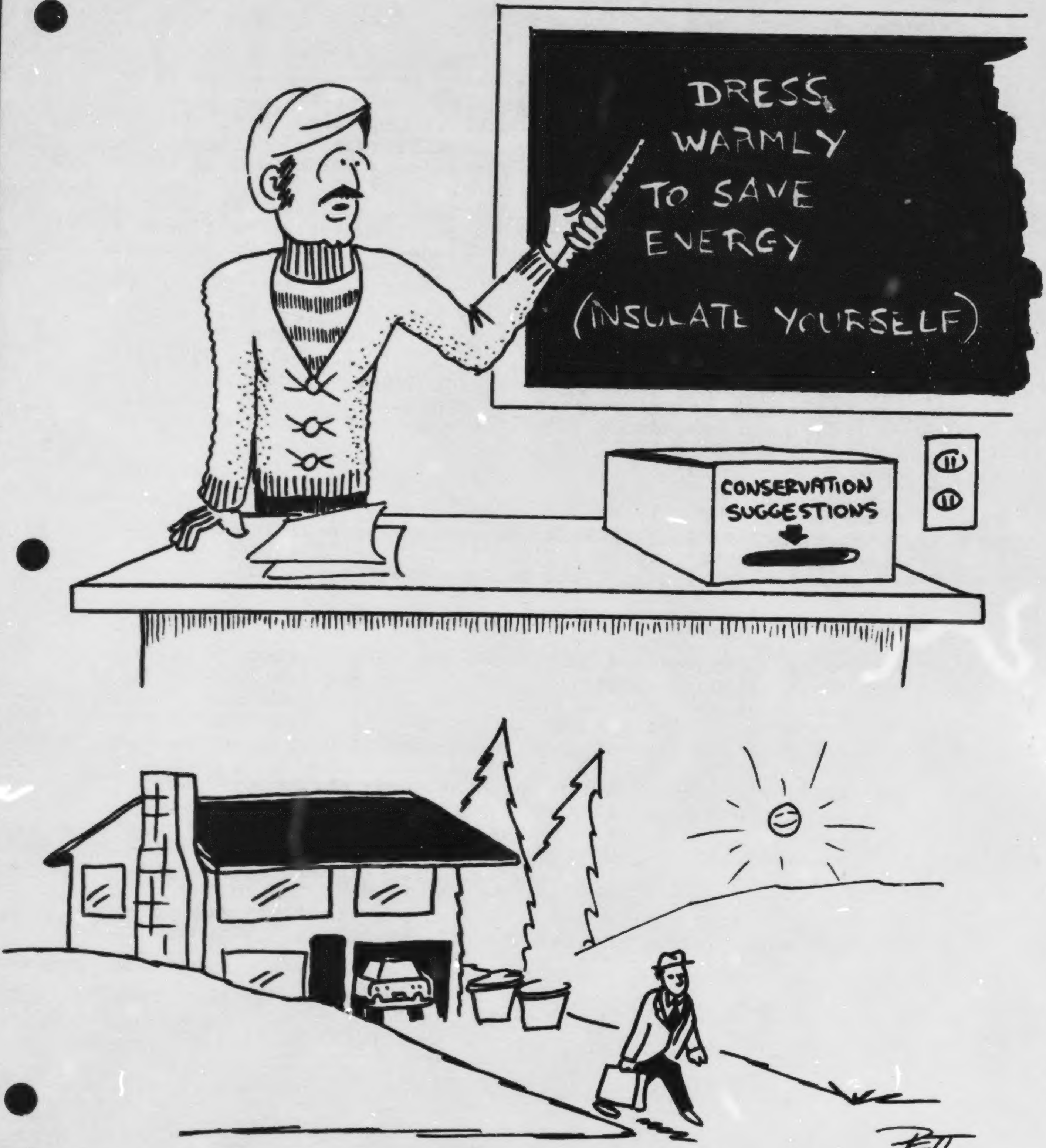



JOBS NOW!
WORK NOT WELFARE
PETT

LESSON 3-2: PICTURE 2-2






DRESS
WARMLY
TO SAVE
ENERGY
(INSULATE YOURSELF)
CONSERVATION
SUGGESTIONS

LESSON 3-3: OUTCOMES FOR THE PLANET

Rationale

The purpose of this lesson is to help students become aware of the global aspects of the energy question. So far we have been dealing with energy sources and products as they pertain to the school, home and community. This lesson introduces the concept of energy interdependence. Energy interdependence is defined as people and groups around the world needing to exchange (import and export) energy sources and products. This lesson will not deal with specific people and countries, but will create a basic awareness that people do not have all the energy sources and products they need and therefore must trade with other people.

Students will be able to define and give examples of imports and exports to and from the United States. Students will "experience" global energy interdependence by playing a card game which simulates a simplified example of needing to exchange energy products. They will see how scarce energy sources and products create the outcome of increasing both dependence and interdependence.

Objective

Students will be able to define and give examples of global energy interdependence. Teachers can assess the achievement of this objective by students' responses to Activity H of this lesson or by Assessment Activity #1 at the end of this chapter.

Main Activity

A. Using a large world map, point out to the students that there are many countries in the world and that different countries have and need different energy sources and products. Point out that, like food, people around the world have different amounts of other energy sources.

B. Ask the students what people can do if they need energy sources and products they don't have. Use the example of the United States needing oil. Ask the students how we could get oil, or any other "good" we need and want but do not produce in this country. Explain that a good is any product that can be bought or sold. When they suggest that we buy oil from a country that has it, put the word "import" on the board. Put the following definition of an import on the board.

> "An import is a good that is bought from another country."

Tell the students that imports come into the country.

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C. Ask the students to give examples of imports they use every day and the areas from which these come. Oil for example, is largely imported from the Middle East. A way forthe students to relate to imports is to have them check out the labels in their clothes and the different makes of foreign cars with which they are familiar.

D. Ask the students what countries can do when they have an energy source to sell. Tell them that some countries have more of an energy source than they need, and are able to sell to countries that do not have enough. Tell the students that this selling is called an "export." Put the following definition of an export on the board.

> "An export is a good that is sold to another country."

Point out to students that exports leave the country.

E. Ask the students to give examples of goods that people in the United States export. Exports such as food, farm equipment, computers and machinery are some they might cite.

F. Tell the students that this exchange takes place with energy sources and products all around the world every day. This buying of energy sources and products is called "interdependence." Tell the students that, just as they need other people to help them in their lives, people all over the world need each other to buy and sell energy sources. Put the word "interdependence" on the board and have the students give examples of how the world is interdependent. Global interdependence means a need people have to exchange goods. Put the following definition of interdependence on the board.

> "Interdependence is people needing and affecting each other all over the world."

G. Tell the students that they are going to play a game showing energy interdependence. They will each be different people that have energy sources and products they will export and import.

1. Divide the class into groups with 5 players in each group. The game is best played with 5 in a group; however, 3 or 4 can play.
2. Assign each player in a group to a role. The five roles are:

Role #1: Ms. Hansen. Ms. Hansen is the president of a company that produces cars in a country called Alpha. These cars are produced and sold in many places all over the world.

Role #2: Mr. Lumba. Mr. Lumba is a private citizen who deals in energy sources and who works for a coal company in country Beta.

Role #3: Ms. Chen. Ms. Chen is a government official acting on behalf of her country, Delta.

Role #4: Mr. Biddle. Mr. Biddle is the president of a company that makes TVs in country Gamma.

Role #5: Mr. Garcia. Mr. Garcia is a government official acting on behalf of his country, Kappa.

3. Give each player the sheet that has the name of his or her role on it telling what each will have at the start of the game and what each needs to acquire. Each player is only to see the list for his or her own role. The attached sheet entitled "Global Energy Game 3-1" can be cut for this purpose.

4. The cards for this game are labeled oil, coal, gas, nuclear and wood. Students should collect information about each of these energy sources. They should be able to make statements such as where the energy source is found, how the energy source is used and how energy products come from sources. Students will use these statements as a basis for receiving energy source cards in the game.

5. Each group will need five cards of each energy resource making a total of 25 cards for each group. The distribution of the 25 cards for each group depends on which role each player has and what the player has at the beginning of the game. Attached is the cards sheet labeled "Global Energy Game 3-2.

6. Put the students in each group in a circle. The object of the game is for each player to get what he or she needs from the other players. This will be done by passing cards (exports) and receiving cards (imports). Cards will always be passed to any person in the group and received from any person in the group. A person desiring a card from another player must first ask for a particular card and make a statement about the char-

acteristics, use, or products. A person desiring a coal service card might make the statement, "Lots of coal is found in Indiana." This is a true statement. Therefore the person would receive the coal card if the other player has it in hand. If the person said, "Lots of coal is found in Texas," that statement would be false and the other player could challenge it. No card would be passed. The first player to have all of what he or she needs lays down the cards and is out. The person to "go out" wins but the game continues until all the players have what they need.

7. To begin the game give each role the proper energy resources and give each instructions to ask for one card at a time. Play should begin with a designated player. Turns will continue on a clockwise rotation.

H. When all groups have finished and when all players have their needed energy resources, begin the discussion by asking the students who won in each group.

1. Begin the discussion of the meaning of the game by asking if all students started out with anything they needed. Relate this to the fact that countries sometimes have all of one source or don't have any of the particular source they need.

2. Ask the students if some players needed less of a source than others. Relate this to an example that the United States needs to import oil where other countries do not.

3. Ask the students if everyone needed the same kinds of energy sources or the same amounts of an energy source. Point out that people around the world use different energy sources, and if they don't have enough of what they need they must import from another country.

4. Relate these ideas to energy interdependence. The students should be able to see that they needed the energy sources that other players had. The only way they could get these energy sources was to "import" them. The energy sources that were not needed were "exported" by passing the cards that were not needed.

- Discuss with the students what would happen if we could not import and export energy sources. Repeat the definition.

5. Summarize by having students define energy interdependence. Discuss how the game was similar to the exchanging of energy sources and products that occurs every day all over the world. Go back to the world map and ask students to name goods they use that come from another part of the world. Help them name the countries and companies that export these goods to the United States. Have them name goods that are produced by people in the United States and are bought by people in other parts of the world. Help them see that interdependence and energy interdependence affect their lives.

I. Now talk with students about the outcomes of energy interdependence. What would happen if there were a scarcity of oil, nuclear energy, or other energy sources? Students should be able to see that the entire globe would be affected by an energy scarcity because we are all linked together in interdependent exchange. Students should also be able to see how their own projects on energy conservation can affect the global energy situation. In effect, they should be able to see that the entire planet is influenced by what they do and that they should recognize the interdependence of the entire world.

Grade Level Adaptation

K-1: Use a map or a globe as a basis for talking with students about interdependence. Use one of the energy sources talked about here and chart how it is traded or exchanged across the globe. Students should be able to see that people are dependent on others for energy sources and that they are traded or exchanged.

2-3: Use one role and the globe as a basis for this lesson and have students think about how the person who needs certain sources might be able to get those sources from different areas of the globe.

Language Arts Adaptation

K-1: Read two of the roles to students and have them use puppets in order to act out how people might get valuable energy sources that they need and exchange them.

2-3: Ask students to work in pairs and act out the negotiations between two people in this lesson who need energy sources.

4-6: Based on the roles in this game, have students create a play in which they emphasize energy interdependence.

Math Adaptation

K-1: Use the five source cards and put them on the globe. Ask students what would happen if the United States, for example, needed more than one-fifth of the energy sources. Students should be able to understand concepts of more or less, using these ideas.

2-3: Have the students count the number of cards in each group in the game and multiply that total times the number of groups that played the game in the class. What is the total number of the cards of the class?

4-6: Have students practice finding percentages by answering the following questions:

1. What percentage of the cards in each group were oil, coal, natural gas, nuclear, and wood?

2. If each group had 25 cards, what percent of the total class cards did it have?

GLOBAL ENERGY GAME 3-1

Role #1: Ms. Hansen. Ms. Hansen is the president of a company that produces cars in a country called Alpha. These cars are produced and sold in many countries all over the world.

The country has at the beginning of the game	The country needs to win
1 oil	3 oil
2 nuclear	1 coal
2 wood	1 natural gas

Role #2: Mr. Lumba. Mr. Lumba is a private citizen who deals in energy sources who works for a coal company in his country, Beta.

The country has at the beginning of the game	The country needs to win
2 oil	3 coal
1 nuclear	2 wood
2 natural gas	

Role #3: Ms. Chen. Ms. Chen is a government official acting on behalf of her country, Delta.

The country has at the beginning of the game	The country needs to win
1 coal	2 oil
1 oil	1 coal
1 wood	1 nuclear
2 natural gas	1 wood

Role #4: Mr. Biddle. Mr. Biddle is the president of a company that makes TVs in his country, Gamma.

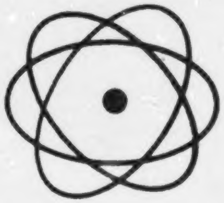
The country has at the beginning of the game	The country needs to win
1 oil	2 natural gas
1 natural gas	2 nuclear
1 nuclear	1 wood
2 coal	

Role #5: Mr. Garcia. Mr. Garcia is a government official acting on behalf of his country, Kappa.

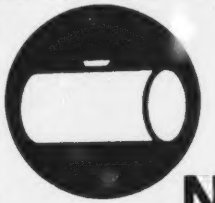
The country has at the beginning of the game	The country needs to win
1 nuclear	1 natural gas
2 wood	2 nuclear
2 coal	1 wood

COAL

WOOD



NUCLEAR



NATURAL GAS

OIL

LESSON 3-4: ENERGY ALTERNATIVES

Rationale

Students have begun to learn about the outcomes of the use of energy in the present and in the future. It is important that they be able to do more than to speculate about these outcomes. They need to be able to analyze systematically what will happen to energy in the future. This involves the skill of forecasting. It will allow them to forecast alternatives, not only for the energy situation in general but for their own everyday lives. In this lesson they will be introduced to the basic skill of forecasting.

Objective

Students will know the basic steps involved in forecasting energy alternatives. Teachers can assess the achievement of this activity through students' responses to Activity F, or through Assessment Activity Two at the end of this chapter.

Main Activity

A. Discuss with students what their image of the future is for themselves, for their school, for their community. Hold an open-ended discussion, the purpose of which is just to get students to think about the future as more than tomorrow and the next day, but as five or ten years from now. You might ask them to write a short essay about what they think their own futures will be like.

B. Now talk with students about how determining the future can be done by thinking about it. But it can also be done more systematically. Use the example of the weather to talk with students about the word "forecasting." People who make weather predictions are engaging in the process of forecasting. They base their forecasts on evidence they have about what the weather has been and what it will be. They determine the likelihood of having rain, or snow, or sunshine. We all attach values to different kinds of states of weather. All of this kind of forecasting involves three essential steps. First of all, people think about alternatives: whether it will rain, or snow, or be sunny. Second of all, people determine the likelihood of those alternatives. When the person forecasting the weather says that there is a "30 percent chance of rain," he or she is talking about the likelihood of that alternative's occurring. Finally, people who forecast the weather can complain about it, or joke about it, or proclaim how wonderful it is. There is a set of values that they attach to different states of weather. These three steps of generating alternatives, determining the likelihood of alternatives, and using values to evaluate the outcome are essential steps in systematic forecasting. Students should be able to name other examples in which forecasting is common in their everyday lives.

C. Now discuss with students how forecasting is common in the energy problem. People consider alternatives and wonder about what the energy situation will be like in five years, ten years, or twenty years. Some people are frightened that there will be none of the sources we use today. Others think that we will need to find new energy sources. All of these people are engaging in forecasting. They are saying that certain alternatives are likely to happen and are attaching values to those alternatives.

Talk with students about one energy source, such as wood, to give an example of how forecasting would be done. The alternatives which could be generated are common ones. The wood supply could stay the same, because people are reforesting and growing new trees. Therefore we might not run out of wood in the future, but it might continue to be a scarce energy source. A second alternative would involve using up wood and not replanting trees. Therefore we would have much less of the wood energy source. Finally we might find ways to grow many, many more trees and therefore have much more of the wood energy source. These three alternatives of things being the same, there being much less of something, or there being much more of something are common alternatives used in forecasting. They certainly apply to any energy source or product. Ask students to speculate about alternatives for an energy source or product that is different from a wood product.

D. Once students have generated their alternatives, have them think about the likelihood of those alternatives. Take the wood example. Have students find evidence regarding the use of wood as an energy source, and extrapolate how current trends in the use of wood would produce results in five, ten, or fifteen years. Have them develop a set of guesses or a set of ratings about whether the same wood use, much less wood use, or much more wood use is likely, and what the results of each possibility would be. Then have them take one other energy source or product and determine the likelihood of its use in the future.

E. Once students have determined alternatives and the likelihood of those alternatives in the future, then talk with them about their basic values in regard to these alternatives. Which alternative do they think is best; what are their reasons for thinking one alternative is better than others? They should be able to outline two or three basic values in regard to wood: for example, it is an important energy source, and we should value the environment around us and should develop habits of conservation. Conservation and valuing the environment are key values that might be involved with any energy source.

F. When students have completed their analysis of wood and other energy sources, ask them to apply their knowledge about forecasting to their own behavior regarding one energy product. Have them determine alternatives for their own action, the likelihood of those alternatives and the values that are involved in them. Ask them to try and carry out actions which will promote the alternative which they prefer and which is most likely.

Grade Level Adaptation

K-1: Ask students to think about their own futures. Have them project what they think they will be like in five or ten years. Then talk about one energy product and its future in the same ways that the students have talked about their own.

2-3: Gather one or two stories that students are reading regarding something happening in the future. Talk with students about what it means to analyze the future and then relate the stories to an energy product with which they are familiar.

Language Arts Adaptation

K-1: Ask students to draw pictures of what they think the future will be like. Ask them to talk about those drawings with you.

2-3: Ask students to do a diorama of what their life or their community will be like in the future, and have them explain their diorama to the class.

4-6: Ask students to write a short story on the future from the point of view of one form of energy. In other words, if oil were to tell a story, how would it predict its future as an energy source and product?

Math Adaptation

K-1: Have students rate the likelihood of some of the alternatives that they talk about as being first, second, or third most likely. You can teach students about how to rate things using this method.

2-3: Ask students to suppose that the likelihood of something happening was multiplied times three. Have them then make their predictions with a multiple of three and see how the future would be different.

4-6: Have students determine the likelihood of various alternatives with the products they study, in terms of percents. They ought to be able to convert the evidence that they have and the ratings that they make into percentages of likelihood that some alternative will happen.

LESSON 3-5: ENERGY AND YOUR FUTURE

Rationale

Students have learned about forecasting. They have thought about energy products in terms of the future. They will now apply what they know to their own futures. It is important for them to see how their own future can be influenced by energy and how their own reactions can shape their future. This is necessary for them to become effective energy actors, not only in the present but in the future roles that they take.

Objective

Students will apply their knowledge of forecasting to their own everyday lives, now and in the future. Teachers can assess the achievement of this objective through Activity E in this lesson or through Assessment Activity Two at the end of this chapter.

Main Activity

A. Discuss with students what they plan to do in their own future five, ten, fifteen, or twenty years from now. Talk with them about what occupations, kinds of homes and family arrangements they think they would like to have. Make a list on the board of the occupations and the types of family arrangements that students list. The purpose here is for students to think about their own futures and what it is they want to do.

B. Now talk with students about energy futures. They have talked about alternative ways that energy might turn out in the future. Use the lists of occupations and home lives to talk about how the futures they have articulated for energy could impact on their everyday lives. Would they have the same jobs? Would they have the same types of homes, depending on a variety of energy futures? Students should see, through this discussion, that the energy future will have a tremendous impact on their own future. They may not be able to have the jobs that they would like; they may not be able to have the homes that they are thinking about constructing. Family life may also change dramatically because of energy.

C. Ask students to interview one person who now holds a position that they would like to have in their school or community. Have them talk with that person about how he or she has carried out that professional life, and how he or she thinks the energy situation has impacted or will impact on it in the future. Then have students reassess how energy might affect their own futures and what they want to do. Talk with the class as a whole about individual students' examples about how energy will impact on their futures.

D. Now have students divide into groups, according to a variety of occupations. Have them develop a skit where they act out their future role and the impact that energy will have on them. Have them present the skits to the class.

E. When the skits have been completed, have students talk about the meaning of what they have done. Debrief their experience by asking them the following three questions:

   1. How is your future affected by what happens in the energy problem?

   2. How does what you do to take care of energy now affect your future?

   3. What basic values are involved in taking care of energy for the future?

Grade Level Adaptation

K-1: Bring someone into class who can talk about his or her professional role and about how energy would affect it.
2-3: Have students interview a person or a group of people that you bring to class. Ask them questions about how they chose what they are doing now and how energy would affect that choice.

Language Arts Adaptation

K-1: Ask students to act out their futures, either as groups or as individuals. Have other students guess what futures they are depicting.
2-3: Ask students to do a collage of the futures that the class projects. They might do a collage of occupations or alternatives and show how energy makes an important impact on their futures.
4-6: Ask students to write a description of a person's life whom they admire. They might want to read a biography in order to write the essay. They should talk about how energy has influenced this person's life, or might influence it in the future.

Math Adaptation

K-1: Ask students to think about the future in terms of years or decades. You can teach them about numbers of years using this method.

2-3: Ask students to add the number of occupations and/or lifestyles that are alike in their class. Then have them multiply the number of categories times the number of classes in their school to find out what a general distribution of occupations or lifestyles would be.

4-6: Have students gather information about alternative occupations or lifestyles in their class or school. Have them rate the occupations or lifestyles from the most common to the least common. Have them determine fractions of people in their class or school that are following certain occupational or lifestyle lines.

LESSON 3-6: YOUR ENERGY PLAN

Rationale

Based on students' skills, knowledge, and participation habits developed in this course, they will now make their own plans for their future energy conservation. They will think about specific things that they can do which will shape their own futures and those of people around them. They will develop concrete plans which they can use after the course so that they can continue habits of energy conservation. These types of habits are the true test of whether or not they have become effective energy actors.

Objective

Students will apply their knowledge and skills to developing their own plans for energy conservation. Teachers can assess students' achievement of this objective through Activity C of this lesson.

Main Activity

A. Talk with students about the development of their own personal plans for energy conservation. They will need to develop a plan which includes their own individual actions and those they might undertake in groups. They will need to cover activities that they can undertake at home, at school, and in their community. They will need to determine what impact they think they can make by carrying out these activities, now and in the future. Students should first begin to just speculate about alternative types of ideas or plans and what they might do. This will give the class as a whole an idea of what types of planned activities it might undertake.

B. Now divide the students into groups. They should develop individual plans in these groups and share them with their classmates. In this way they can get feedback on the plans that they are developing and can gather ideas from other students.

C. Students should then report to the class on each of their plans. They should get ideas from the class on how they can more effectively serve as energy actors and what impact it will make.

D. Students should then discuss their plans with a person that you bring into class, or someone that they can think of in their community who would be an important reviewer of their plans. This person might be a parent, a member of the community, or one of their peers. Students should write out what they learned in the interview and incorporate it into the plans that they have made.

E. Over the period of the next few weeks or longer, talk with students about how they are implementing their plans. Devise a way that you can follow through with them by either forming a club or scheduling meetings, so that students can have reinforcement for their energy activities. Otherwise they may not carry them out. Either scheduling meetings or forming a group or finding a way to interact with them personally will satisfy this criterion.

Grade Level Adaptation

K-1: Ask students to formulate their plans in terms of what they can do at home for energy conservation.
2-3: Ask students to formulate their plans around what they can do in school about energy conservation.

Language Arts Adaptation

K-1: Ask students to make their plans and to put them on tapes, so that you can later play them back and students can review what they said they would do.
2-3: Have students develop posters which can remind them of the activities which they have promised to carry out. Have them develop slogans which will help them to remember to do what they have planned on an everyday basis.
4-6: Have students put together all of their plans in some kind of a notebook, so that it can be used by others in their school and in future classes.

Math Adaptation

K-1: Have students count the number of things that they are doing in their plans and the time that it takes in order to do it.
2-3: Ask students to determine measures for how much energy they might save and add these measures together for the class as a whole.
4-6: Ask students to determine the percentage of energy they will save over a period of years. They may want to graph these percentage savings in order to see how their energy conservation activities can multiply over the years.

ASSESSMENT ACTIVITIES FOR CHAPTER 3

The assessment activities below will aid in evaluating the students' awareness of the global aspects of the energy situation. These assessment activities are designed to determine the knowledge students have acquired from the lessons in Chapter Three. They can be used at the end of a lesson or at the end of the chapter.

Assessment Activity 1. Assessment Activity 1 is an acrostic puzzle. The questions at the bottom of the page are to be filled in. Then using the numbers below the letter as a reference, complete the quote. The answers are found on Assessment Activity sheet 1-2.

Assessment Activity 2. The assessment activity involves students' looking at energy alternatives. Students can use the three pictures to explore the impact of the energy problem. Each picture focuses on a particular aspect of the problem - the non-renewable nature of energy sources, increased use, and increased population. Have students answer the questions posed in the pictures individually or in groups.

ENERGY ACROSTIC

— BY PETT

PUT THE LETTERS FROM THE CLUES BELOW ON THEIR CORRECT LINES IN THE QUOTE AT THE RIGHT. WHEN YOU'RE FINISHED, YOU'LL HAVE SOME GOOD ENERGY ADVICE! — NOTICE THAT AFTER YOU GET SOME OF THE LETTERS OF THE ANSWER, YOU CAN GUESS THE REST, HELPING YOU GET THE CLUES!

3-124

CLUES

1 ① A WORLD WITHOUT ENERGY IS THE WORST POSSIBLE ___ ___ ___ ___ ___ ___ ___.
1 2 3 4 5 6 7

② AS THE POPULATION CLIMBS, AND ENERGY RESOURCES DIMINISH, WE MOVE ___ ___ ___ ___ ___ ___ ___ AWAY FROM WISE ENERGY USE.
8 9 10 11 12 13 14

③ ENERGY SAVING IS REALLY ___ ___ ___!
15 16 17

④ WE CAN AVOID ENERGY DISASTER ___ ___ ___ ___ EVERYONE'S HELP.
18 19 20 21

HERE'S THE QUOTE! ↓

" ___ ___ ___ ___ ___ ___
9 4 3 17 1 18

___ ___ ___ ___ ___ ___
8 5 10 20 12 7

___ ___ ___ ___ ___ ___!"
15 2 11 16 14 13

— ___ ___ ___.
21 19 6

↑ AND HERE'S WHO SAID IT!

ENERGY ACROSTIC

—BY PETT

PUT THE LETTERS FROM THE CLUES BELOW ON THEIR CORRECT LINES IN THE QUOTE AT THE RIGHT. WHEN YOU'RE FINISHED, YOU'LL HAVE SOME GOOD ENERGY ADVICE! —NOTICE THAT AFTER YOU GET SOME OF THE LETTERS OF THE ANSWER, YOU CAN GUESS THE REST, HELPING YOU GET THE CLUES!

3-125

CLUES

1 ① A WORLD WITHOUT ENERGY IS THE WORST POSSIBLE O U T C O M E.
1 2 3 4 5 6 7

② AS THE POPULATION CLIMBS, AND ENERGY RESOURCES DIMINISH, WE MOVE F A R T H E R AWAY FROM WISE ENERGY USE.
8 9 10 11 12 13 14

③ ENERGY SAVING IS REALLY F U N!
15 16 17

④ WE CAN AVOID ENERGY DISASTER W I T H EVERYONE'S HELP.
18 19 20 21

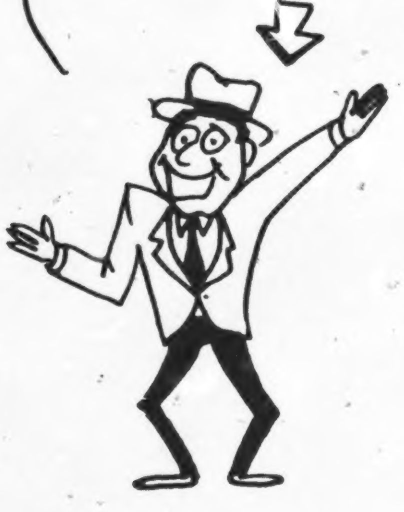
HERE'S THE QUOTE!

"A C T N O W
9 4 3 17 1 18

F O R T H E
8 5 10 20 12 7

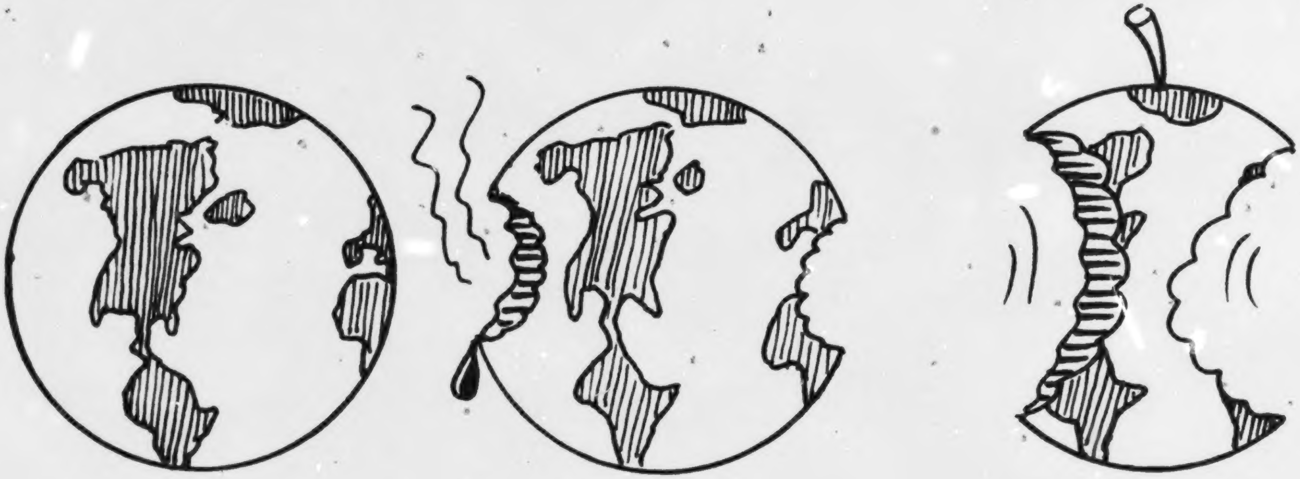
F U T U R E!"
15 2 11 16 14 13

— H I M.
21 19 6



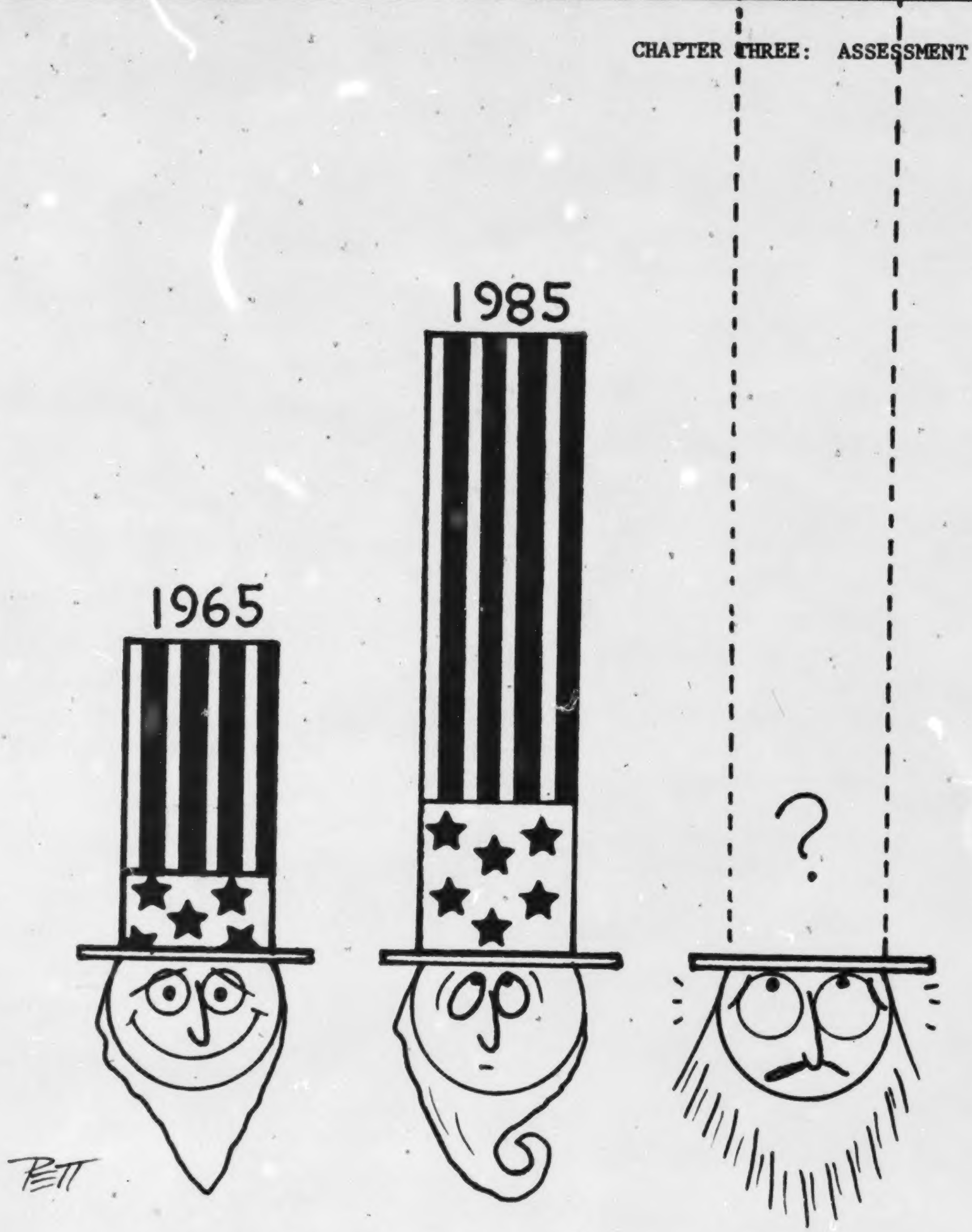
AND HERE'S WHO SAID IT.

CERTAIN *NON-RENEWABLE* ENERGY RESOURCES PROVIDE MOST OF THE ENERGY WE NOW USE. THESE ARE OIL, COAL, AND NATURAL GAS. SINCE THESE ALL COME RIGHT OUT OF THE EARTH, AND CANNOT BE REPLACED,* WHAT WOULD EVENTUALLY HAPPEN IF WE DO NOT EXPLORE ALTERNATIVES?



PETT

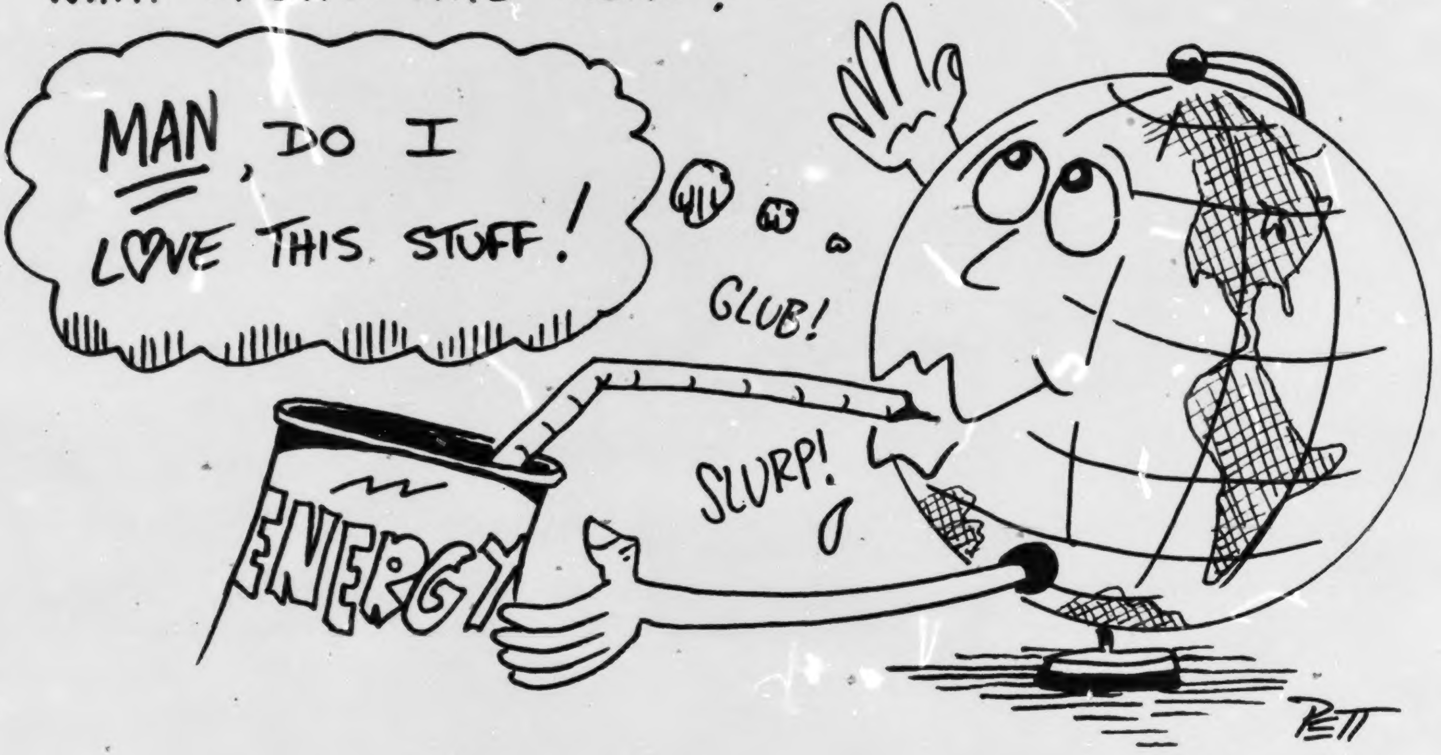
* ACTUALLY, SINCE THE EARTH MADE THEM, IT IS POSSIBLE FOR THE EARTH TO REPLACE THEM. BUT IT WOULD TAKE MILLIONS OF YEARS!!



EXPERTS SAY THAT ENERGY CONSUMPTION HERE IN THE U.S. IN 1985 WILL BE TWICE WHAT IT WAS IN 1965. WHAT COULD THIS MEAN ABOUT THE NEED TO EXPLORE ENERGY ALTERNATIVES?

SOURCE: U.S. BUREAU OF MINES.

WORLD CONSUMPTION OF ENERGY DOUBLED DURING THE SIXTEEN YEARS BETWEEN 1960 AND 1976!! IF THE POPULATION CONTINUES TO INCREASE, AND WE CONTINUE TO USE JUST AS MUCH ENERGY, WHAT MIGHT THIS MEAN?


MAN, DO I LOVE THIS STUFF!
GLUB!
SLURP!
ENERGY
PETT

SOURCE: ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

STUDENT ENERGY SURVEY

UNIT III

This assessment of knowledge, skills, attitudes, and participation habits can be used as a pretest, a posttest, or both. A copy of the survey is enclosed. This survey is designed to measure student growth and includes the main ideas from the entire unit.

There are three parts to this survey. The first part assesses knowledge and skills, and the second part assesses attitudes about energy conservation. The third section focuses on habits of participation regarding energy conservation.

Teacher Directions:

Section I

1. Read the directions for the first section of the test aloud to the class.
2. Demonstrate on the board how students should mark their answers.
3. Go over the example to make sure students understand that they should circle the correct answer.
4. You may want to read each question as the student does. Continue until all twenty items are completed.
5. Here is the key for correct answers:

    1. B
    2. C
    3. A
    4. B
    5. D
    6. B
    7. D
    8. A
    9. B
    10. C
    11. A
    12. C
    13. D
    14. C
    15. A
    16. D
    17. B
    18. D
    19. A
    20. C

Section II and Section III

Repeat the above procedure for Section II and Section III. Make sure the students understand these direction as they are different from those for the first section. They should circle the response that is true about them in these two sections.

Energy - Unit III Name ____________________

Section I: Knowledge & Skills

DIRECTIONS: 1. You will be answering some questions to see how much you know about energy.

2. Read these directions silently while your teacher reads them aloud.

3. After each statement, circle the letter of the BEST answer.

4. Here is a practice item. Circle the letter of the BEST answer.

People get energy from

A. food.
B. books.
C. toys.
D. minerals.

Food is the best answer, so circle A.

5. Ask your teacher if you need help.

---

1. If we had to live without electricity for one day, there would be no lights, no TV or radio, and probably no heat or hot water. These results are called

A. energy sources.
B. outcomes.
C. exports.
D. energy products.

2. Which occupations will energy affect in the future?

A. mostly transportation occupations
B. mostly engineers
C. all occupations
D. Energy will not affect occupations.

3. Which of the following is a true statement about energy sources?

A. Most sources have problems associated with them.
B. Most sources will be available for a very long time.
C. Few sources can be conserved.
D. Few sources affect the way we live.

4. Wind, water and wood are examples of

A. fossil fuels.
B. energy sources.
C. car fuels.
D. food sources.

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5. Students were asked to find out about the past use of gasoline in this country. Some students looked in books, others asked their parents, and some students took a poll in the neighborhood. All of these students were

   A. predicting.
   B. forecasting.
   C. valuing.
   D. gathering evidence.

6. When groups make decisions about energy, often a few important people in the group decide. This is called

   A. one-person rule.
   B. minority rule.
   C. majority rule.
   D. consensus rule.

7. Which of the following is an example of a fossil fuel?

   A. wind
   B. water
   C. nuclear
   D. coal

Refer to the following story when answering question #8, #9, and #10.

Students in Mr. Lind's class were discussing ways to conserve energy. Some of the students wanted to lower the temperature in the school to conserve energy. Other students really didn't think this was necessary, especially since they didn't want to wear bulky sweaters and warm shoes and socks. The students decided to take a vote. The majority voted to try to lower the temperature in the school. Mr. Lind asked for volunteers to figure out ways to do this. The volunteers proposed that a letter be written to all the parents, teachers, and students explaining why it was important to turn down the heat and wear warmer clothes. After hearing this idea, another student suggested that they check the amount of fuel or electricity used for the last month at their school and compare it to the amount used in the month after the letter was sent. All of the students thought this was a good idea.

8. Lowering the temperature was an energy issue because

   A. some did not enjoy wearing sweaters.
   B. Mr. Lind thought it was a good idea.
   C. students wanted to do something to save energy.
   D. turning down the temperature would conserve electricity or fuel.

9. The plan to write a letter to teachers, students, and parents best answers which of the following questions?

   A. Who will decide?
   B. How will the decision be carried out?
   C. How will the results be determined?
   D. What are the issues involved?

10. The idea of comparing energy usage for two different months best answers which of the following questions?

A. Who will decide?
B. How will the decision be carried out?
C. How will the results be determined?
D. What are the issues involved?

11. Students in Ms. Rossi's sixth grade class were studying energy conservation and their energy ideas that were important to them. Susie said that she liked to save things like toys or clothes or energy. Sandy said that she didn't want to save energy because it was too hard to do. Ann said that she liked to take care of her money.

Based on the above story, which of the following statements is true?

A. Susie valued saving energy.
B. Sandy valued saving energy.
C. Ann did NOT value saving energy.
D. All three valued saving energy.

12. A calorie is a measure of the energy that is produced by

A. lights.
B. coal.
C. food.
D. oil.

13. Which of the following terms are most important for understanding global energy interdependence?

A. win/lose
B. input/output
C. fight/switch
D. import/export

14. Students in Mrs. Smith's class decided to wear warmer clothes to school. That way Mrs. Smith could keep the room cooler to save energy. Which of the following were major energy actors in this situation?

A. school officials
B. government officials
C. students
D. members of Congress

15. Which of the following is a problem associated with solar energy?

A. Setting up a solar energy system is expensive.
B. Setting up a solar energy system is dangerous.
C. Solar waste disposal is difficult.
D. Solar energy creates environmental pollution.

16. Which of the following is NOT true when talking about fossil fuels?

    A. They are non-renewable.
    B. They are extracted from beneath the earth.
    C. They are transformed into energy and energy products.
    D. They are in abundant supply.

Refer to the following story when answering question #17 and #18.

Mike was a fifth grade student who had been learning about energy conservation. He had learned that TVs used electrical energy to operate. He noticed that often he left the TV on even when he wasn't watching it. He choose not to do this any longer even though he felt it would be easy to forget. That very day, Mike turned the TV off when he started talking to his father. He continued to turn the TV off when he wasn't watching it many times that week and following weeks.

17. When Mike noticed that he often left the TV on even when he wasn't watching it, he was

    A. following up.
    B. thinking about it.
    C. deciding.
    D. taking action.

18. When Mike turned off the TV when talking to his father, he was

    A. following up.
    B. thinking about it.
    C. deciding.
    D. taking action.

19. Coal, an energy source, is mined, refined, and moved to a plant where it is used to make electricity. Which of the following best describes this entire process?

    A. energy transformation
    B. energy transportation
    C. energy mining
    D. energy products

20. Which of the following is a problem associated with nuclear energy?

    A. Nuclear energy can cause a cooling of the water supply.
    B. Clouds can cause a lack of direct sunrays.
    C. Disposal of nuclear waste is difficult.
    D. Nuclear energy results in air pollution.

Section II and III: Attitudes & Participation

DIRECTIONS:

1. You will be reading some statements to see how you feel about energy.

2. Read these directions silently while your teacher reads them aloud.

3. After each statement, circle the answer that is true about you. There are five answers to choose from.

   If you strongly disagree, circle "NO!".
   If you disagree, but not strongly, circle "no".
   If you partly agree or are not sure, circle "sometimes".
   If you agree, but not strongly, circle "yes".
   If you strongly agree, circle "YES!".

EXAMPLES:

I want to have a well balanced meal.	NO!	no	sometimes	yes	YES!
I want to learn more about solar energy.	NO!	no	sometimes	yes	YES!

4. If you have any questions, ask your teacher for help.

Section II: Attitudes

1.	It is OK to use lots of energy.	NO!	no	sometimes	yes	YES!
2.	I would rather travel by car than walk a short distance.	NO!	no	sometimes	yes	YES!
3.	Energy habits are important to me.	NO!	no	sometimes	yes	YES!
4.	Adults will take care of energy problems.	NO!	no	sometimes	yes	YES!
5.	If we run out of energy sources, someone will find more.	NO!	no	sometimes	yes	YES!
6.	I should conserve my own energy.	NO!	no	sometimes	yes	YES!
7.	I want to learn more about good energy habits.	NO!	no	sometimes	yes	YES!
8.	I want to change my habits to save energy.	NO!	no	sometimes	yes	YES!
9.	It is unfair to have to turn down my heat just to save energy for someone else.	NO!	no	sometimes	yes	YES!
10.	I can help solve energy problems.	NO!	no	sometimes	yes	YES!

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Section III: Participation

1. I have tried to convince a friend to save energy.	NO!	no	sometimes	yes	YES!
2. I have asked someone to turn down the heat to save energy.	NO!	no	sometimes	yes	YES!
3. I leave the TV on in my home when no one is watching it.	NO!	no	sometimes	yes	YES!
4. I ride my bicycle to save gasoline.	NO!	no	sometimes	yes	YES!
5. I have asked someone to drive 55 m.p.h. to save gasoline.	NO!	no	sometimes	yes	YES!
6. I waste energy in my home.	NO!	no	sometimes	yes	YES!
7. I leave lights on in my home when I do not need them.	NO!	no	sometimes	yes	YES!
8. I use paper on both sides.	NO!	no	sometimes	yes	YES!
9. On my own, I have read a book or magazine about energy.	NO!	no	sometimes	yes	YES!
10. I recycle bottles and cans.	NO!	no	sometimes	yes	YES!

ADDITIONAL INSTRUCTIONAL MATERIALS

GRADES 4-6

This is an annotated selection of energy education materials appropriate for the indicated grade level. To aid the teacher in making an astute selection the following criteria have been used: 1) usability in an instructional setting, 2) compatibility with Indiana's energy curriculum project, 3) emphasis on active student participation, 4) emphasis on the development of an energy conservation ethic, 5) relevance to the students' lives, and 6) accuracy and up-to-dateness of energy facts and trends.

The ABC's of Electricity. Channing L. Bete Company, Inc., Greenfield, Massachusetts 01301. 1975. 15 pp. $.50.

Illustrated booklets with information about production, transformation and use of electricity.

Bringing Energy to the People: Washington, D.C. and Ghana. (Grades 6-7). Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy. National Science Teachers Association. Available from U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, Tennessee 37830. 1978. 63 pp. No charge.

Four lessons which are primarily oriented toward social studies. The climate, location, energy dependency, and services of two countries are compared. Emphasis on map and chart reading skills.

Energy. National Wildlife Federation, 1412 Sixteenth Street N.W., Washington, D.C. 20036.

A good eight page overview of energy supplies, demands, types of sources, and alternatives.

Energy Activities for Junior High Social Studies. Minnesota Department of Education, 640 Capitol Square Building, 550 Cedar Street, St. Paul, Minnesota 55101. 1977. No charge.

Seven well done activities that can be easily simplified for use in upper-elementary classes. Especially good for value clarification in relation to energy use.

Energy Activities for the Classroom. Herbert Coon and Michelle Alexander. ERIC/SMEAC Information Reference Center, The Ohio State University, 1200 Chambers Road, Columbus, Ohio 43212. 1976. 148 pp. $4.50.

This is a source of energy teaching activities related to source, production, distribution and use. Each activity is classified by grade level, subject matter and energy concept.

Energy and Conservation Education: Activities for the Classroom. (Grades 4-6). Energy and Man's Environment. 0224 S.W. Hamilton, Suite 301, Portland, Oregon 97201. 1977. $25.00.

This is a comprehensive multi-disciplinary publication in a looseleaf binder with 58 specific activities each organized around the headings of title, concept, objective, time, subject matter, area, grade, implementation, and materials.

The Energy Challenge. (Grades 5-8). Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830. 1976. No charge.

24 duplicating masters of student activities about energy in the past, present, and future. Teaching guide included with these six energy units.

Energy Conservation Experiments You Can Do. Thomas Alva Edison Foundation, Cambridge Office Plaza, Suite 143, 18280 West Ten Mile Road, Southfield, Michigan 48075. 1978. 32 pp. No charge.

Eleven experiments demonstrating energy conservation in the areas of heating and air conditioning, hot water, appliances and lighting, and solar. All experiments can be done with common household materials.

Energy Conservation: Understanding and Activities for Young People. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock #041-018-00091-7. 1975. 20 pp. $.85.

This is a booklet which provides brief background information followed by suggestions for activities and projects which can be adapted for teacher use. The topics are What Is Energy, Energy Conservation, and Uses of Energy.

Energy Crisis. Channing L. Bete Company, Inc., Greenfield, Massachusetts 01301. 1974. 15 pp. $1.50.

Short illustrated booklet dealing with past and future needs.

The Energy Crisis - What You Can Do About It. Amoco Teaching Aids, P.O. Box 1400 K, Dayton, Ohio 45414. $1.00 pre-paid.

A teaching resource consisting of three pages of teacher's instructions and five student activity sheets on ditto masters. Explores the causes and possible solutions to energy problems.

Energy Puzzles. William J. Crouch, Hayes School Publishing Company, Inc., Wilkinsburg, Pennsylvania. 1975. 18 pp. $2.50.

Eighteen spirit duplicating masters about energy sources. Good basic information.

Energy Sources - SCIS II (Science Curriculum Improvement Study). American Science and Engineering, Inc., 20 Overlook Street, Boston, Massachusetts 02215. 1978. 142 pp. $7.50 for teacher's guide.

This is a level 5 Physical Science unit which is part of a comprehensive series. The complete kit for this unit costs $212.50, but the teacher's guide is available separately. The unit has 20 chapters with many experiments teaching the concepts energy source, energy receiver, and energy transfer.

Energy Sources of the Future. McGraw Hill Films, 1221 Avenue of the Americas, Chicago, Illinois 10020. $12.50/rental.

This film examines the need for new ways to provide for growing energy needs and new trends and ideas in energy production.

Environmental Education, Energy - Society. (Grades 4-12). Bureau of Secondary and Elementary Education, DHEW/OE, Washington, D.C. 20009. $3.50.

Numerous student learning activities for various grade levels based on behavioral objectives. Each provides the purpose, suitable level, related subjects and methods along with a resource list. Good, but not essential.

Food: Energy from the Sun. BFA Educational Media, P.O. Box 1785, Santa Monica, California 90406. $15.00/three-day loan.

Shows how we get our energy from eating plants as well as meat from animals which feed on plants.

Iowa Energy Conservation Activities Packet. (One each for grades 4, 5 and 6). Iowa Energy Policy Council, 215 East Seventh Street, Des Moines, Iowa 50319. 1977. $2.00 each.

Attractive and usable units with instructions to teachers and eye-catching worksheets for students. One section in each unit is devoted to energy, the other to personal accommodation.

It's Your Environment. Sherry Koehler, Ed. Charles Scribner and Son, 597 Fifth Avenue, New York, New York 10017. 1976. 218 pp. $1.95/paperback plus shipping.

Good elementary information and activities on the effect of energy on life and our use of it. Text, illustrations, and suggested projects explore environmental concerns of urban areas.

Learning Activity Packets. Energy Management Center, P.O. Box 190, Port Richey, Florida 33568. Three booklets, 55 pp. each. $1.75 for three. Teacher's guide - $8.25.

Designed specifically for fourth grade students, this validated IV-C project has activities about energy, sources, and conservation. Good section on energy chains.

Networks: How Energy Links People, Goods and Services. (Grades 4 and 5). Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy. National Science Teachers Association. Available from U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, Tennessee 37830. 1978. 102 pp. No charge.

Six interdiciplinary social studies/science lessons about electrical distribution and consumption. Specific activities for experiments and role-playing included in student guide portion of the publication.

Science Activities in Energy. (Grades 4-6). Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830. No charge.

A science package containing four file folders of 57 activities and experiments that illustrate certain principles and problems related to various forms of energy and its development, use, and conservation. The topics are Solar, Electrical, and Chemical Energy as well as Energy Conservation. Well-illustrated with simple, revealing experiments.

Teaching About Energy Awareness: 33 Activities. Materials Distribution, Center for Teaching International Relations, University of Denver, Denver, Colorado 80208. 1978. 179 pp. $7.95.

19 of the 33 lessons are directed toward elementary students. Most lessons include an introduction, objective, grade level, time and materials needed, procedures, and student materials. Some good ideas for short lessons.

Visual Masters in Energy Resources: Past, Present, and Future. J. Weston Walch, P.O. Box 658, Portland, Maine 04104. Order # L6409R-4. $9.00/set.

Informative visual masters that are appropriate for use with Chapter 1 of Unit III of Indiana's lessons. Designed to be made into transparencies.